July 1983

An independent magazine published by ECC Publications

sinclair user

75p

Issue No 16

NEW AWARD — THOUSANDS OF £££s IN PRIZES

STORAGE PROBLEMS? — OPEN OUR FILE ON THE RAMPACKS

Find the female angle on the ZX-81

Make sweet music from the BEEP

Early launch of Microdrives pledged

Spectrum gets a supporting role of architects

We hear the roar of the mighty Dragon

Discover the best addresses for powerful programming

READ HELPLINE FOR THE BEST ADVICE

COMPETITION-PRO JOYSTICK

PRECISION GAME CONTROL!

SPECTRUM JOYSTICK NOW AVAILABLE FROM WHSMITH Boots

Access
BARCLAYCARD
VISA

Outstanding Features

- Self centreing stick
- Super strong nylon and steel construction
- A total of 8 directions *plus* 2 large fire buttons (for left or right handed operation)
- Arcade proven moulded leaf switches ensure incredible reliability
- Complete with boxed interface on Spectrum models
- A wide range of Joystick compatible software readily available from W H Smith and leading computer shops or direct from us

NEW

Conversion Tape I Only £4·95 – Converts seven leading arcade games to run with the Kempston Joystick: Horace Goes Skiing – Sinclair, Hungry Horace – Sinclair, Flight Simulation – Sinclair, Arcadia – Imagine, Penetrator – Melbourne House, Spectres – Bug Byte, Space Zombies – Mikrogen.

ALSO

Conversion Tape II Only £4·95 – Converts: Orbiter – Silversoft, Escape – New Gen, Tanx – DK 'Tronics, Centipede – DK 'Tronics, Spectral Invaders – Bug Byte, Cruising On Broadway – Sunshine, Frenzy – Quicksilva (Early Versions).

Joystick Compatible Spectrum Software now available from Kempsoft:
■ Astro Blaster ■ Blind Alley ■ Cosmic Guerilla ■ Cosmos ■ Cyber Rats ■ ETX ■ Frenzy ■ Frogger ■ Galaxians ■ Gulpman ■ Jet Pac ■ Joust ■ Knot in 3D ■ Mazeman ■ Meteoroids ■ Night Flite ■ PSSST ■ 3D Tunnel ■ Time Gate ■ Slippery Sid ■ Spookyman

See the Kempsoft Advertisement on page to order your software.

Hardware I wish to order the following:		AMOUNT
☐ **New** Spectrum Joystick Interface, allows you to use any Atari/Commodore type joystick with Spectrum	@ £15·00	
☐ Spectrum Joystick including interface	@ £24·99	
☐ VIC 20, Commodore 64, Atari 400/800 Joystick	@ £14.50	
Please tick appropriate boxes All prices include P&P and VAT. Overseas prices add £4·00 P&P	TOTAL	

Cheques/postal orders should be made payable to Kempston (Micro) Electronics Ltd
Please debit my Access/Visa* Account (*delete as applicable)

Account No

Signature _____ Name _____

Address _____

Please post to Kempston (Micro) Electronics, Dept SU7
180a Bedford Road, Kempston, Bedford, MK4 88L

SOLE UK DISTRIBUTOR

KEMPSTON MICRO ELECTRONICS

Contents

sinclair user

incorporating Spectrum User

Editor
Nigel Clark

Consultant editor
Mike Johnston

Production editor
Harold Mayes MBE

Staff writer
John Gilbert

Program reviewer
Rebecca Ferguson

Editorial director
John Sterlicchi

Advertisement manager
John Ross

Sales executive
Annette Burrows

Editorial assistant
Margaret Hawkins

Production assistant
Dezi Epaminondou

Managing director
Terry Cartwright

Chairman
Richard Hease

Sinclair User is published monthly by ECC Publications Ltd.

Telephone
All departments
01-359 7481

If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to:
Sinclair User and Programs,
ECC Publications,
30-31 Islington Green,
London N1 8BJ

Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £10 for the copyright of each program published and £50 per 1,000 words for each article used.

© Copyright 1983
Sinclair User

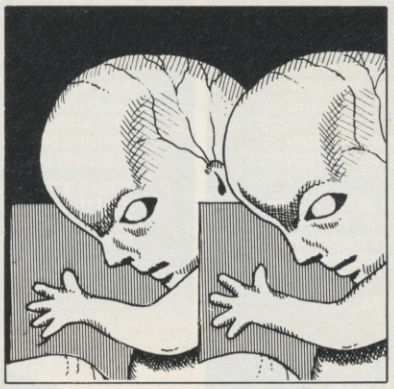
ISSN No 0262-5458

Printed and typeset by
Cradley Print PLC,
Warley,
West Midlands

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411

Cover Photograph:
Max Bradley

Cover Illustration:
Richard Dunn



page 28

page 96

5 SINCLAIRVOYANCE We look into the future at possible developments of new machines.

9 SINCLAIR USER CLUB Games for the Spectrum and the ZX-81 are among the offers.

13 NEWS The Microdrive and the Micronet adaptor are imminent; there is growing speculation about Smiths ending sales of the ZX-81; software and much more.

17 LETTERS We have a wide variety of your opinions of recent moves in the world of Sinclair computers.

23 HARDWARE WORLD Stephen Adams reviews the improved printer for the ZX-81 which has been produced by Timex and the other latest hardware items.

27 SOFTWARE SCENE Another three pages of cassette reviews as the programs continue to reach the market.

33 DRAGON In our continuing series we look at another competitor.

37 SPECTRUM ASSEMBLERS Writing programs in machine code is difficult. John Gilbert reviews some of the cassettes which can make it easier.

44 RAM PACKS Memory expansion for the ZX-81 is a subject about which we receive many queries. Stephen Adams assesses what is available.

49 PROGRAM PRINTOUT Another 14 pages of listings for the Spectrum and ZX-81.

66 USER OF THE MONTH Our regular feature moves to Great Yarmouth, where Celia Sims proves that computing is not an exclusively male pastime.

72 MUSICMAKER In an extract from a recently-published book, Ian McLean shows how to make music from the Spectrum sound.

75 BEAMSCAN More and more technical uses are being found for the Spectrum. David Marsh reviews a new cassette which helps to ease the problems of architects.

81 BOOKS John Gilbert reads some of the latest books on how to start programming.

85 SYSTEM VARIABLES Dilwyn Jones shows how to make the best of the Spectrum for your programs.

91 STARTING FROM SCRATCH For new owners of Sinclair machines, this is where to start.

92 SINCLAIR SIMON More adventures of our popular cartoon hero.

96 HELPLINE Andrew Hewson returns to problems about the display.

103 MIND GAMES Quentin Heath emerges from his dungeons to write about chess.

NEXT MONTH
We shall announce details of our new programming awards sponsored jointly with CCS. More than £2,000 in prizes is being offered in the search for the programmers of the future. Do not miss your copy.

"IT LOOKS NICE BUT WHAT THE HELL CAN I DO WITH IT?"

Every ZX SPECTRUM Print'n'Plotter Jotter has 100 pages of finely printed screen grids.

50 for the high resolution screen. 50 for the normal character screen.

With these at your disposal you can plan practically any graphics print-out to program into your computer.

The high-resolution PLOT grid shows every one of the 45,060 pixels! Every one printed. Every one with its co-ordinate numbers. This gives you enormous graphics power to DRAW, PLOT, CIRCLE, PLOT OVER and so on in any position or screen building up graphic drawings, charts, maps . . . in fact anything without the complications of guesswork, integer out of range, or wrongly positioned pixel colours which change PRINTed INK characters!

The normal character PRINT grids on the other hand will allow you to be specific about PRINT AT, TAB, PRINT OVER, SCREEN$ and INK / PAPER in direct co-ordination with PLOT . . . you see every page is printed on **high quality tracing paper** . . . ideal to overlay on to illustrations and 'copy' or co-ordinate.

And there's another bonus, because each page contains 24 User-definable grids — **2400 per pad!**

With 50 pages of PLOT grids, 50 pages of PRINT grids 2400 user-definable grids, a set of colour pens, a printed PIXEL RULER and our Special Offer of demo programs, IT'S THE BEST VALUE IN ZX GRAPHICS PROGRAMMING.

"NOW WHICH KEY DO I PRESS TO SHOOT DOWN THE THING FROM MARS?"

Ever forgotten which key to press when playing a game?
Do you suffer from a mind-boggling mass of programmed keys?
Do you write programs that use different keys to perform various functions? If so, we have just the thing for your ZX SPECTRUM.

A pack of Print'n'Plotter Keyboard Overlays.

Just write the function or functions under each key you program and keep the overlay for the next time you play the game.
Of course there's lots of more uses you will find for our OVERLAYS, user defined characters, keyboard scanners, mathematical programs, business uses — to name just a few.

There's TEN OVERLAYS to a pack — so you can program with impunity! And they fit perfectly onto your standard ZX SPECTRUM KEYBOARD. Each OVERLAY is printed with the cursor movement key directions and there's room for program name etc.

A SPECTRUM CONSOLE THAT EVERYONE CAN AFFORD!

For the cost of a 'games' cassette you can have a truly professional console for your SPECTRUM!

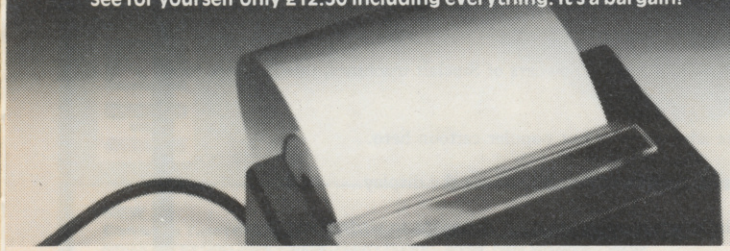
We've cut costs (not cut quality) by designing a self-assembly method using relatively inexpensive materials like strong corrugated board.

The result is a console that's tough, light, highly finished and capable of giving years of useful service.

Facilities include ergonomic keyboard angle, access to rear of machine, choice of P.S.U. internal or external, and alternative of Printer on-board or cassette storage area. Fully illustrated instructions are included.

"PRINTER PAPER THAT WORKS? I DON'T BELIEVE IT!"

Five rolls of our PRINTER PAPER will only cost you £12.50 including postage, packing and VAT! And you'll gain a great deal more!
It prints beautifully. It's not too thick. It's not too shiny. Print is black — not grey. It actually feeds through the machine!
See for yourself only £12.50 including everything. It's a bargain!



Post today to Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE or phone: 01-403 6644 (General) or 660 7231 (Credit Card Sales).

Name: .....

Address.....

.....

.....

SC

.... ZX SPECTRUM JOTTER @ £9.95 each
.... ZX SPECTRUM KEYBOARD OVERLAYS @ £2.95 per pack
.... ZX SPECTRUM CONSOLE @ £8.25 each
.... ZX PRINTER PAPER @ £12.50 per five rolls
.... ZX SPECTRUM DEMO CASSETTES @ 95p each
.... ZX81 JOTTER PADS @ £3.50 each
.... ZX81 FILMS @ £2.25 each
.... ZX81 GRAPHICS PROGRAMMING GUIDE @ £1.50 each

Remittance enclosed. Please bill my Access / Barclaycard / Visa / Mastercard No:

All prices include VAT, P&P. Overseas orders please add 25% for additional surface mail.

"WHERE CAN I GET THEM?"

You can see and buy most of our products at:
W. H. Smith (Computer Stores)
Boots (selected branches)
Buffer Micro (Streatham 01-769 2887)
Microware (Leicester 0533 29023)
Dennys Bookshops (London EC1 01-253 5421)
Personal Computer Services (Darwen Lancs 0254 776677)
Telford Electronics & Computing (Shifnall 0952 460008)
Georges Bookshop (Bristol 0272 276602)
Microtech Systems (Gillingham Kent 0634 571321)
Northampton Home Computer Centre (0604 22539)
Philip Copley Hi Fi (Ossett W. Yorks 0924 272545)
Darlington Computer Shop (Darlington 0325 487478)
Lancashire Micros (Morecambe Lancs 0524 411435)
North East Computers (Peterhead 0779 79900)
Photo-Video (Hereford 0432 267997)
Computers for All (Romford 0708 752862)
March Software (Sawbridgeworth Herts 0279 724341)
Evesham Micro Centre (Worcs 0386 48635)
Computer City (Widnes, Cheshire 051 420 3333)
Landau Electronics (Sutton 01-643 5494)
D&J Computers (Stevenage 0438 65501)
Software Machine (London SE3 01-305 0521)

Educational Supplies through Griffin & George Ltd.
Australasian agents: Centrum Systems. Tel: (Perth) 4441031.

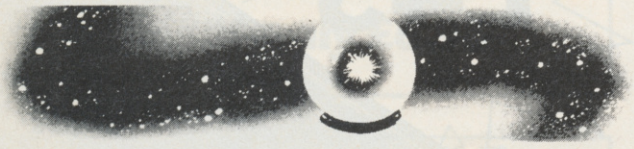
Early end for the ZX-81?

IN 1980, Clive Sinclair surprised the world and set himself back on the road to fame and fortune by introducing the first computer for less than £100. There had been programmable calculators costing less which had been on sale for some time but that was the first time a machine which could properly be called a computer had been put on the market.

It had only 1K and its black and white graphics were limited, but it was a computer. If Clive had done nothing after that he would have been assured of a prominent place in the development and spread of the use of computers.

Three years later, however, we have the 16K Spectrum for the same price of £99.95. Sixteen times the RAM, far better graphics and colour, are all now available. At that rate of progress it is amazing to think what might be possible in the next three years.

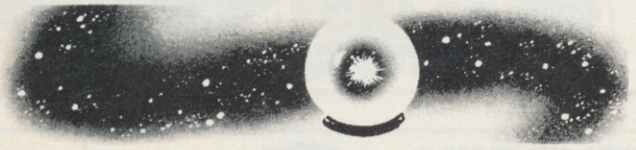
The next stage is probably fairly easy to predict. It is widely



expected that the new machine planned by Sinclair Research will be a portable computer intended for the business market. In the home market, however, the next steps are likely to be an improvement on the Spectrum. All Sinclair users know that there are plenty of areas in which the Spectrum can be improved. Better sound, the ability to obtain more complex graphics, and a standard keyboard would be likely to feature on everyone's list, along with a debugged ROM.

It is unlikely, though, that Sinclair would be willing to make small-scale improvements to a successful machine. Any new computer would thus be different in many ways from the Spectrum, while still being based on the technology which has already been developed.

For an idea of what the addition to the Sinclair range might



be like it is good idea to look across the Atlantic at what Timex is planning to do. The major changes which are expected in producing the TS2000 are the removal of the ROM bugs and the addition of a ROM cartridge port to ease the problems of loading pre-recorded programs.

If in Britain better sound and graphics and an improved keyboard are included, there is the basis of a new computer to compete in the home market.

From there we must move into the realm of even greater speculation based on the experience of previous developments in electronic products and the innovation of Sinclair Research. For a start we have the other developments in the company, particularly the flat-screen television and the Microdrive.

It has already been announced that both would be part of the portable business machine, so there is no reason to suppose that they could not also be part of a home computer. By increasing the size of the screen to that of a portable television, it would probably be possible to have a computer which looked just the same as a small set with a keyboard.

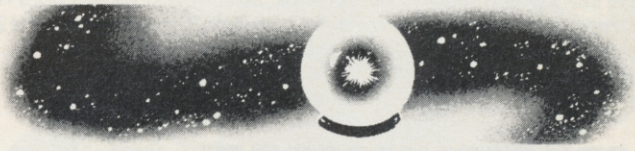
It should not be too difficult to take the Microdrive interface on board which, as it includes a RS232 interface, would allow a normal printer to be used with it.

Put all that together and you have a machine looking similar to what everyone assumes a computer should look like but with vastly increased power and at a fraction of the cost.

There is only one consideration which could stop that picture developing. While many people have criticised Sinclair machines for not looking like proper computers, it has certainly been one of their advantages that they have been easily recognisable. The closer the company moves to the expected formula of a computer, albeit with more power and at less cost, it loses some of its character. It is just another machine in a very crowded market.

Sinclair is no doubt aware of that and with its award-winning designer, Rick Dickinson, is probably working on ways of avoiding that situation. One idea from the *Sinclair User* think tank is to have a cased keyboard containing the computer with a hinged lid containing the screen but we are sure that the Sinclair research department has plenty of ideas of its own.

With improved chip development, it is also likely that



memory will become cheaper in much the same way that prices of calculators fell dramatically in a very short time. The first result of that will be a steady fall in prices, as is beginning with the Spectrum.

That will probably mean the early end to sales of the ZX-81. Few people will be willing to buy a basic machine of that kind, no matter how small the price, when a machine with the capabilities of the Spectrum might cost very little more.

There is probably a base price for computers of about £30. When a machine reaches that price it would be better to increase the facilities rather than to reduce the price any further.

Another outcome of those developments would be the end to the split between the business and home markets. With more power for less money it is inevitable that a manufacturer will make a product which can handle the needs of a small business, yet cheap and compact enough to be within reach of the home user. Sinclair Research could be the company to offer such a machine.

One thing is certain. In another three years the home computer market will be vastly different from what we know today. Computers in the home will be more accepted and those who bought the ZX-80, ZX-81 and the Spectrum will be seen as pioneers of a new leisure industry. There will be vintage computer clubs for the nostalgia market — and the acceptance of powerful machines as part of the furniture.

dk'tronics

ZX KEYBOARD FOR USE WITH/81 SPECTRUM

Our new cased keyboard has 52 keys, 12 of these are used for the numeric pad. The numeric pad offers some useful features, you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The pad is a repeat of the 1-9 keys plus it has a full stop and a shift key. The numeric pad keys are coloured in red, the normal keyboard keys are grey, with the case being black which makes the whole thing very attractive. The case measures 15 × 9 × 2½. The computer (either 80/81 or spectrum) fits neatly inside. You will have to remove the computer from its original case, it is then screwed to the base of the case. The case had all the bosses already fitted and the screw holes are marked. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All the connections are at the rear of the case i.e. Power, Mic, Ear, T.V. and the expansion port. The case is large enough for other add ons also to be fitted inside. One of these could be the power supply, then you could very quickly fit a mains switch, or a switch on the 9V line. This means you have a very smart self-contained unit. This case does not stop you from using any other add-ons that you may have e.g. Printer etc. We are convinced that this is the best keyboard available at present. It offers more keys and features than any other keyboard in its price range.

£45

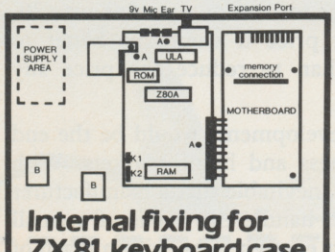
KEYBOARD (SPECTRUM/81)

NOTE

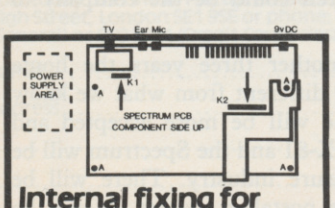
The case can be purchased separately with the keyboard aperture uncut, so if you have one of our early uncased keyboards, or in fact any other suppliers' keyboards, these could be fitted. The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute job and requires no electronic skills. This keyboard does not need any soldering. Please specify on order whether you require the ZX 81 or Spectrum case.

SPECTRUM MODEL

This is supplied with spectrum legends, and a slightly different base for fitting the spectrum inside, again all the connectors are at the rear of the case and there is plenty of room for the power supply (and other add-ons). Should you want to change, we can supply both the Spectrum legends and details of updating your case which will enable modification from the ZX 81 to spectrum. PLEASE specify on your order whether you require the ZX 81 or spectrum case.



Internal fixing for ZX 81 keyboard case.



Internal fixing for spectrum keyboard case.

SPECTRUM LIGHT PEN

The pen enables you to produce high resolution drawings on your own television set, saving a vast amount of time over using basic programming statements, such as Plot, Draw etc. You can erase, modify and save drawings and it comes complete with software program. The superb light pen is available from D.K. tronics.

£19.95

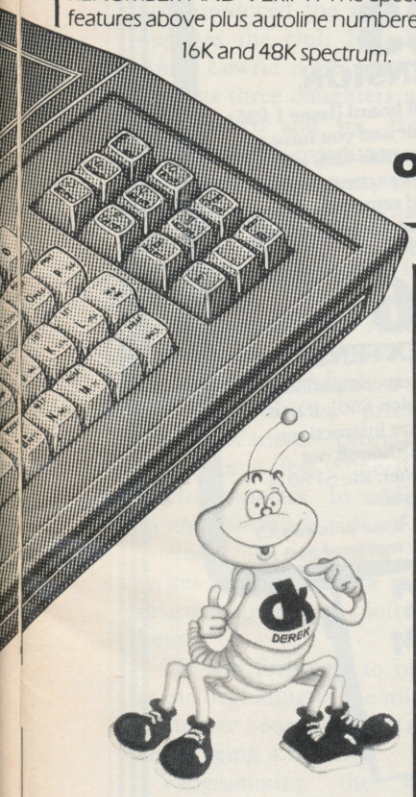
16K Memory Exp
The 16K uses 4116 D
Static Ram and occu
using the Static Ram
speed low power R
the computer. All t
which comes to yo
where. Position in

64K Memory Exp
All the above inform
advantage lies in th
56K of usable mem
the use of other ad
8192-65536. The Bl
Spectrum Memor
Upgrade your Spect
it is simply slipped in
are supplied, and th
time. The fitting req
same as Sinclair's u

ZX 80~81 Spectrum HARDWARE

SPECTRUM/81 TOOLKIT

This is the toolkit which won acclaim in the feature in the August 1982 issue (pages 29 and 30) of Sinclair User. "It is the most impressive program, fast in execution with clear and full instructions...it stands out from the rest of the field." The ZXED is a powerful editor for use on the expanded ZX81. It is intended for use by the serious BASIC programmer and offers several useful and time saving features most helpful during all stages of program development. The facilities provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, INSERT, KEEP, MOVE, RENUMBER AND VERIFY. The Spectrum Toolkit contains most of the features above plus autoline numberer and append, and will run in the 16K and 48K spectrum.



Both at only £6.95

4K GRAPHICS ROM £24.95

The DK Graphic module is our latest ZX 81 accessory. This module unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there, it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/RAM and can be used for user definable graphics so you can create your own custom character sets.

WHY WAIT?
ORDER TODAY FOR FAST DELIVERY

FLEXIBLE RIBBON CONNECTOR

If you have ever had whiteouts or system crashes this could be the answer. It stops the movement between the computer and the RAM expansion, it is supplied with a ribbon, 6 inches long, with a male connector at one end and a female at the other, at only

£10

16/64 MEMORY FOR ZX 81

16K Memory £22.95
16K (uncased) £19.95
64K Memory £52.95
64K (uncased) £49.95

The above illustration shows the casing for the 16K or massive 64K.

xpansion £22.95
6 Dynamic Ram Chips. We use the dynamic as they are much denser than ccupy less space. They are also much cheaper than the equivalent product an. The Ram is manufactured with high quality materials, and uses high Rams. It is supplied ready-built and only needs to be plugged into the rear of ll the components are fitted into holders. This massive add-on memory ou fully assembled and tested is the cheapest 16K memory available any- n memory from 16384 to 32768. (Same as the Sinclair memory.)

16K (UNCASED) £19.95

xpansion £52.95
ormation on the 16K also applies to the 64K Memory Expansion, but the the 64K giving nearly FOUR times the memory. This advanced model has mory. In addition, the block from 8K to 16K can be switched out to enable dd-ons. The graphics ROM is to be used in this area. Position in Memory: Block From 8192-16384 is switchable.

64K (UNCASED) £49.95

ory Expansion MK1 £35.00, MKII £30.00.
ectrum to 48K of user Ram. The Spectrum memory expansion is simple to fit, inside the case, and then only requires plugging in. Full fitting instructions the only tool you will need is a screwdriver and just two minutes of your equires no electronic skills. Position in memory from 32768 to 65536. (The upgrade to 48K).

Please state type of machine, which Rom memory size, quantity and place when ordering.

Please send me . . . . . @ £ . . . . .

Please send me . . . . . @ £ . . . . .

Please send me . . . . . @ £ . . . . .

Please add on £1.25 for P/P

In enclose cheque/P.O. payable to DK Tronics total £ . . . . .

or debit my Access/Barclaycard ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature . . . . . BARCLAYCARD VISA

Name . . . . . .

Address . . . . . .

. . . . . .

Send to DK tronics, Unit 2, Shire Hill Ind Est, Saffron Walden, Essex CB11 3AQ. Tel: (0799) 26350 (24 hrs) 5 lines.

dk'tronics

New colour brochure now available, send SAE for quick return

EAST LONDON EXCLUSIVE

ZX81 RAM-PACKS FLAP

and when RAM packs flap, programs crash because of edgy connectors (so children! keep off!).
Now East London Robotics offer a unique product:-

TRADE IN YOUR ZX 81.

Introducing the **MAXIMEM ZX81.** A ZX81 with 32k or 64k RAM fitted INSIDE the case (children come back!)
MAXIMEM ZX81 – the most affordable 32 or 64k micro in the world.

EAST LONDON ROBOTICS

MAXIMEM ZX81

32k-£39 PLUS ONE USED 1k ZX81

64k-£59 PLUS ONE USED 1k ZX81

The MAXIMEM 32 and 64k is a modified ZX81 and not just a RAM pack. We give a six month guarantee on the computer, regardless of the age of your trade-in ZX81. The extra memory uses only a quarter of the power consumption of a 16k plug-in memory, and does not interfere with any standard add-ons, such as printers, RS232 or other interfaces.

Trade in your ZX81 by post or over the counter at our premises. (Phone first to check current delivery). Trade-in ZX81s must be clean and in working order. Send and receive the computer only, without manuals, power supplies etc.

EAST LONDON ROBOTICS

SPECTRUM 48-£23
32k MEMORY EXTENSION

Plug the chip-set (Issue 2) or circuit board (Issue 1 £35) into the sockets provided by Sinclair and you have a standard 48k Spectrum, fully compatible with all Sinclair add-ons and very low in power consumption. No soldering is required. Fitting and removal are easy. The SP48 carries our full warranty and is upgradable on a part-exchange basis to the SP80.

SPECTRUM 80-£46
PAGED 64k MEMORY EXTENSION

Fitting, power consumption and add-on compatibility are identical to the SP48 (Issue 1 version £50). It can be used as a standard 48k, but software instructions can switch to a second page of 32k. Although not recommended for the complete beginner, the SP80 is of tremendous benefit to the serious user.

Fit and Test Service: At our premises £3
By registered post £7

STOP PRESS
TRICKSTICK TEAM IN TRAINING
A Company team of four ready to take on all comers. Fabulous prizes for successful challengers.

ZX SLOWLOADER £10

Loads ZX81 tapes into your Spectrum. A recent letter describes it best.

Dear Sir, Just a line about your excellent Slowloader.
I bought it because I was nearing the completion of a project which uses practically everything in 16k RAM including a string array (DIM 629,7) which took 4 hours hard graft to bash in. I really did not fancy doing it all again.
SLOWLOADER twice found a tape-loading error. So I SAVEd again onto a short, high-quality tape – and this time it went straight in. Two minutes to take out the SLOW and FAST lines, 10 to renumber the PEEKs and POKEs, 20 to add some colour and a few BEEPs, and the thing was ready to SAVE again. What a little masterpiece!

All products on this order form are in stock at the time of going to press.

Same day dispatch for phoned Access and Visa orders.

To East London Robotics Ltd. Please send by return (tick items required).

	£	p
☐ MAXIMEM 32k. (£39+ZX81)		
☐ MAXIMEM 64k. (£59+ZX81)		
☐ SP48 (Issue 1 £35) (Issue 2 £23)		
☐ SP80 (Issue 1 £50) (Issue 2 £46)		
☐ SLOWLOADER £10		
☐ Free Catalogue (SAE only)		
Postage		65p

I enclose a cheque/PO for _____
My Access/Visa number is

Name _____

Address _____

SU 2

TRICKSTICK

A revolution in computer games control, for one to eight players simultaneously. On sale soon.

EAST LONDON ROBOTICS

GATE 11. ROYAL ALBERT DOCK. LONDON E16.
24 HOUR INFORMATION SERVICE TEL: 01 471 3308
24 HOUR ACCESS AND VISA ORDERING TEL: 01 474 4715
SPECIAL ENQUIRIES TEL: 01 474 4430

Meet the voice at the end of the telephone query service

Help-line man is revealed

WE THOUGHT it was time we introduced the man who operates the club Help-line. Andy Lawrie is 35, married, and has three daughters aged between 10 and six. He is employed as a computer engineer with a third-party mainframe computer maintenance company, where he is shift leader at a large site in London.

He maintains two Amdahl 460 and two NAS 9060 processors, plus hundreds of disc and tape drives, printers, communications processors, and even a few SuperBrain microcomputers. In addition to the hardware side of the business, he manages and writes programs for a major microcomputer software house.

He was fortunate to be in at the beginning of the microcomputer boom, his first machine being a Scrumpi.

Programming the little beast was really hard work but it provided a thorough grounding in how a microprocessor chip operates.

The next stage was to build a Triton computer, as published in an electronics magazine. It had a 2K Tiny Basic; a rather limited monochrome display; a slow, unreliable cassette interface; and could be expanded from 1K to 3K RAM. It cost about £350 — probably the equivalent of £550 at today's prices — and was the best you could obtain at anything like the price.

The Triton was extended gradually, mostly to Lawrie's design, during a period of three years, to the stage where it was running CP/M on disc, although by then it had virtually none of the original circuitry left.

On a bench next to the Triton there resides a S-100 bus computer with a 15MB Winchester disc, which is used as a word processor when replying to your queries. The big disc also holds a database of members' names and addresses, which is helpful when members want to contact other local members.

The database is updated regularly by the Club offices and sent to Lawrie on floppy disc. There is an Epson printer and a range of modern micros — a ZX-81, Spectrum, Oric, Lynx; Lawrie's favourite is the Spectrum.

You will be able to see that he is well-qualified to answer most of your questions but you can be sure of one thing — if he does not know, he will not 'flannel'. Some of the subjects about which he is asked are very wide-ranging; recently he was asked questions about copyright law.

At this point, he has asked us to make a request. The most difficult questions are often those about specific programs or hardware add-ons. They can be very difficult as it would be impossible to be familiar with them all. His advice, in those instances, is usually first to consult the manufacturer or suppliers, as they should know most about their products.

Large discounts given by Abbex and DJL on arcade-quality games

BIG DISCOUNTS on a number of software items are available in this month's special offer. They include a wide range of cassettes for the Spectrum and some of the best games on the market for the ZX-81.

We have been able to secure from Abbex a 20 percent reduction in the price of all its cassettes, which include **Spookyman** and **Android's Run.** Owners of the ZX-81 will be able to save 25 percent on **Zuckman** and **Froggy** from DJL Software. Froggy is also available for the Spectrum. The full range of games included in the offer is shown below with the normal and offer prices.

As usual, the offer is open only to members but so that new members can take advantage of the discounts, orders can be included with the application.

Existing members should send orders to Abbex Electronics, 20 Ashley Court, Great North Way, London or DJL Software, 9 Tweed Close, Swindon, Wiltshire.

	List price	Offer price
Abbex		
Spookyman	**£4.95**	**£3.95**
Cosmos	**£4.95**	**£3.95**
Androids Run	**£5.95**	**£4.75**
High Noon	**£5.95**	**£4.75**
ETX	**£5.95**	**£4.75**
Invasion	**£5.95**	**£4.75**
Faust's Folly	**£5.95**	**£4.75**
DJL		
ZX-81		
Zuckman	**£5.95**	**£4.45**
Froggy	**£5.95**	**£4.45**
Spectrum Froggy	**£5.95**	**£4.45**

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name .....

Address .....

.....

.....

.....

Which computer do you own?

ZX-81 ☐ Spectrum ☐

Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair User Club.

Sinclair User Club

Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Basildon Microcomputer Club: Roger Sims, Wickford 63032, after 6.30pm. Meetings every other week on Tuesdays from 7.30 to 10pm at Healey Management Services, The Hemmels, Laindon, Essex.

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357. Meetings held on second and fourth Wednesday of each month.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh ZX Users' Club: J Palmer (031 661 3183) or Ken Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

EZUG-Educational ZX-80–81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other week on Wednesday evenings.

Glasgow ZX-80–81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth Monday of each month.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Barker, 54 Brixton Road, London SW9 6BS.

Liverpool ZX-Computer Centre: Keith Archer, 17 Sweeting Street, Liverpool 2.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Epsom, Surrey KT19 0SY.

National ZX-80 and ZX-81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30 to 10 pm. Further information from R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-80–81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield ZX Users' Club: A W Moore, 1 Ketton Avenue, Sheffield S8 8PA, Yorkshire. Annual subscription 10, monthly newsletter and cassette.

Sittingbourne: Anurag Vidyarth (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Stratford-on-Avon ZX Users' Group: Chris Parry, 16 Sackville Close, Stratford-on-Avon, Warwickshire.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworthy, Bury, Lancashire. Exchanges information and programs throughout the country.

ZX-80/ZX-81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgium: ASBL BDMA Belgium National Sinclair Club; P Glenisson, Rue De l'Epeestraat, 14, 1200 Bruxelles.

Belgium, France and Luxembourg: Club Sinclair, Raymong Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468).
Belgian User Group for Sinclair owners (BUGS); Op de Beeck, Patrick, Drabstraat 144, 2510 Mortsel.
Micro-Europe Club; R Betz, Chemin du Moulin, B1328, Ohain, Belgium. Telephone: CCP 000 0846556–37.

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.
J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jencyzyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Italy: Sinclair Club, Vie Molimo Vecchio so/F, 40026 Imola, Italy.
Genova Sinclair Club; Vittorio Gioia, Via F Corridoni, 2-1, telephone 010 3125 51.

Micro-Europe: Belgium or Club Paris-Micro, 19 Rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX-80–81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.
Johannesburg ZX Users' Club: Lennert E R Fisher, PO Box 61446, Marshallstown, Johannesburg.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana.
International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S–122, 22 Enskede, Sweden.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).

FABULOUS!

SINCLAIR ADD-ON OFFER

from 16k – 48k

With our ME48 memory expansion add-ons your ZX Spectrum can increase its capacity by up to three times.

★ No soldering ★ easy to fit ★ simply plug in ★ fully guaranteed ★ no loss of memory through wobble or white out.

NB. Before ordering your Spectrum add-on please check which Spectrum you have in your possession.
At the back of the ZX Spectrum the metallic contact strips can be clearly viewed. In the series A the space separating the strips is the same width as the strips. In the series B the strips are twice as wide as the space between.

SPECTRUM

ME48 Series A £34.50
Series B £24.50

ZX81 ME16 £19.25
ME64 £44.25

NEW The External ME16-48K plugs into the back of your Spectrum, suitable for series A & B.

EXTERNAL ME16-48K £39.95

FANTASTIC

ZX81 & SPECTRUM
SS1 SPEECH SYNTHESISER
SIZE 3½"x 5¾"x 1"

- ★ Make amazing speech effects with your ZX Spectrum.
- ★ Specially designed for use with your Spectrum. Just plugs in, no dismantling or soldering.
- ★ No power pack, leads, batteries or other extras.
- ★ Ample volume for built in loudspeaker, Manual Volume Control on panel. Can be plugged in to Existing hi-fi system.
- ★ Uses only one memory address.
- ★ Free Dictionary of Sounds.

SS1 SPEECH SYNTHESISER £39.00

NEW LEVEL-VU PRISM

Allows you to see your tape counter without moving from your seat!

- ★ attaches easily to recorder body or lid
- ★ fits most recorders including Radio Shack, Vic-20, Atari
- ★ greatly magnifies counter numerals

LVP £3.99

NEW TAPE LOAD ANXIETY?

Vu-Load takes the frustration out of loading your ZX81 or Spectrum programmes.

- ★ insures programme load every time
- ★ monitors tape output level
- ★ gives positive save indication
- ★ detects blank tape without disconnecting cassette wires
- ★ ready to use – no wiring

TL £19.99

NEW MICRO TAPE

Save it – first time, on American micro-tape

- ★ Specially designed for use with micro-computers
- ★ Low drop-out occurrence
- ★ Uniform Coating
- ★ High saturation level
- ★ So good, we can guarantee them for 12 months!

*NB. Add 40p Post & Packaging to the price of all items.

AUDIO DIGITAL AD.C12 – 55p
AD.C20 – 65p

★ Free 23 line memory test programme with every add-on.

COMPUTER ADD ONS
7-9 Thane Works, Thane Villas London N7

Please tick the appropriate box to order your Computer Add-on:

Memory Expansion Spectrum ME48 Series A ☐ Series B ☐
ZX81 ME16 ☐ ME64 ☐ Speech Synthesiser SS1 Spectrum ☐
ZX81 ☐ Tape Load TL ☐ Level VU LVP ☐
Audio Digital AD.C12 ☐ AD.C20 ☐ External ME16-48K ☐

*NB. Add 40p Post & Packaging to the price of all items.

I enclose a cheque or postal order for _____ made payable/crossed to Computer Add-ons, or I would like to pay by Access and I enter my number and signature accordingly *Allow 28 days for delivery.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature _____

Date _____

Name _____

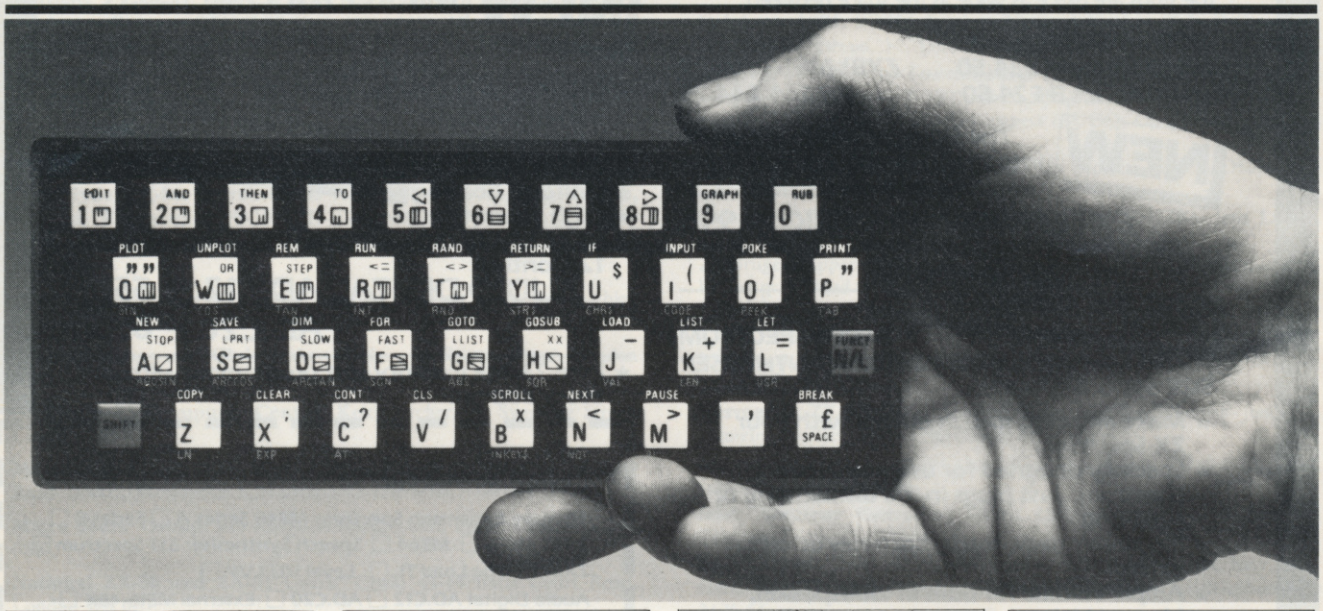
Address _____

_____

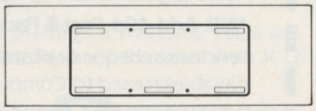
Occupation _____ SU4

COMPUTER ADD-ONS 7-9 Thane Works, Thane Villas London N7

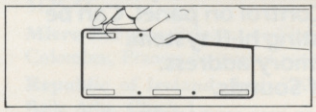
NOW. A ZX81 PUSH-BUTTON KEYBOARD FOR UNDER £10.



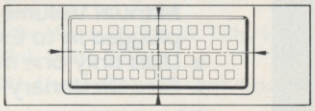
1. Make sure the original keyboard is clean and check that all the keys function.



2. The Buttonset is held in place by self-adhesive pads.



3. So all you do is remove the protective backing.



4. And place it centrally on your ZX81.

At last there's a really cheap but efficient way of ironing out the ZX81's only real bug: its keyboard. The Filesixty Buttonset offers:

■ A full-travel calculator-type moving keyboard for only £9.95. ■ Installed in seconds. The peel-off adhesive backing means you just register into position and press. ■ No messy labels, dismantling or soldering. ■ 3 groups of colour keys to pick out shift, numerals and newline. ■ Precision moulded in ABS to match your ZX81, with contrasting legends for maximum legibility.

Filesixty Ltd., 25 Chippenham Mews, London W9 2AN, England.
Tel: 01-289 3059. Telex: 268 048 EXTLDN G 4087.

Orders to Filesixty Ltd., FREEPOST, London W9 2BR.

Cheques/PO made payable to Filesixty Ltd.

Please send me _____ (qty.) Buttonset(s) at £9.95 each (including VAT and P&P).

Total £ _____ BLOCK CAPITALS

Name _____

Address _____

SU8

FILESIXTY

Microdrive promised 'in a month or so'

SINCLAIR RESEARCH now has an official target date for release of the Microdrive. The company is keeping the precise date secret but a spokesman said:

"The release will be within the next month or so. We are at such an advanced stage that we have our target date."

The Microdrive will be offered to the first 1,000 people who ordered a Spectrum last year. The reason is that Sinclair wants to compensate for the long periods of waiting experienced by many customers last year.

The device was announced last year when the Spectrum was launched. Since then customers have been promised several launch dates but the Microdrive never appeared.

The delays have been caused because Sinclair has had difficulty with the prototypes of the device. The drive contains a floppy tape cartridge and the tape which was tried at first started to stretch in tests. Sinclair had to find a replacement, and metal tape, costing considerably more than ordinary tape, was discussed.

Sinclair met criticism from the Advertising Standards Authority about its advertisement for the device but the company now hopes its new target date will be met.

New award offers £2,000 in prizes

MORE THAN £2,000 is being offered in prizes in a new award for programming being sponsored by *Sinclair User* and CCS. The award will be launched in *Sinclair User* next month and it is intended it should be made annually. There will be a theme each year and this year the judges will be looking for the best strategy and adventure program.

The idea is to stimulate good programming skills and one of the considerations for finding the winner will be programming style. Other features such as originality and the ease of using the cassette will also be taken into account.

The winner will be awarded £1,000 and have the opportunity to have the program published. The winner can be a program for either the Spectrum or the ZX-81 but the second, third and other prizes will be split between the two machines.

The judges will be well-known figures in the Sinclair market. The award will be made at the ZX Microfair before Christmas. *Sinclair User* is also looking to expand the interests it covers each month. We are looking for short stories of about 2,000 words with a computer theme. Any budding authors should send typed manuscripts for consideration.

Spectrum Top Ten

Program	Last month	Company	Memory
1 Flight Simulation	12	Psion	48K
2 The Hobbit	1	Melbourne Hse.	48K
3 Penetrator	5	Melbourne Hse.	48K
4 Vu-3D	6	Psion	48K
5 Horace Goes Skiing	14	Psi/Ml. Hse.	16K
6 Vu-File	17	Psion	16K
7 Hungry Horace	10	Psi/Ml. Hse.	16K
8 Planet of Death	16	Artic Computing	48K
9 Transylvanian Twr.	3	Shepard	48K
10 Chess	—	Psion	48K

Compiled by W H Smith.

ZX-81 Top Ten

Program	Company	Memory
1 Flight Simulation	Psion	16K
2 Monster Maze	New Generation	16K
3 Galaxians	Artic Computing	16K
4 Chess	Psion	16K
5 Catacombs	J K Greye	16K
6 QS Scramble	Quicksilva	16K
7 Space Raiders	Psion	16K
8 Gulp	Campbell	16K
9 Mazogs	Bug-Byte	16K
10 Avenger	Abacus	16K

Compiled by W H Smith.

Retail fears for ZX-81

THE FALL in the price of the ZX-81 has given rise to fears that W H Smith, the biggest retailer of Sinclair products, is reducing its stocks of hardware and software to withdraw from the ZX-81 market.

It has been said Smiths reduced the price £10 lower than other dealers because it had 20,000 ZX-81s in stock and wanted to sell them faster. A spokeswoman for the company denied the fears. She said:

"The ZX-81 is still a very popular machine and we will continue to stock it. We have no plans to drop either the ZX-81 or its software."

The company says that the only reason for falling stock

BOB DENTON

levels of ZX-81 software is that few companies are still producing tapes for the machine.

Bob Denton, managing director of Prism Microproducts, which is the wholesale distributor for Sinclair Research, is worried by the moves in the market.

He regards the new price ridiculously low.

Market unites

A COMPUTER trade association has been formed by some of the biggest companies in the computer market. The association has been formed by Virgin Games Ltd, a division of Virgin Records, which specialises in computer games.

Representatives of retailers, distributors, software houses, manufacturers and consultants have been asked in a mass mail-out campaign to join the group, which is pledged to achieve a professional code of conduct to govern dealings in the trade and with the public.

Some of the smaller companies in the Sinclair market are beginning to worry about the Computer Trade Association and what it could mean to their businesses.

ROM cartridges are planned by Sinclair

SINCLAIR RESEARCH is to launch an adaptor for the Spectrum which will allow owners of the machine to use plug-in ROM cartridges. The launch date is set for late summer.

They will allow the user to have instant access to programs stored in the permanent Read Only Memory of the cartridges.

The adaptor will cost less than £20 and each cartridge will cost approximately £10.

One advantage of the system is that 16K machine owners will be able to run 48K programs, because the cartridges will not use the internal RAM of the Spectrum.

The range of software which is to be put on to ROM will include new languages, such as Forth, assemblers, disassemblers and arcade games.

Sinclair Research is already starting to approach software houses which it thinks can help with programs to go on to cartridge. The company hopes that its software will do well because cartridges sold by other computer manufacturers tend to be more expensive. It hopes to reduce the cost of cartridge software by almost half of current prices.

Breakdown risk cover

FOR THE first time Sinclair computer owners can insure their machines after the guarantee period has expired. The Personal Computer Insurance Scheme is run by Graham Brown and Co. It is the first specialist insurance scheme designed specifically for personal computers.

The scheme covers computers and peripherals in the home, in educational environments and in an office. The protection is against 'all risks', through both internal breakdown and accidental loss or damage during travel.

The cost of the insurance starts at £7.50 for a year on a system of a value up to £100. That increases depending on the value of the system involved.

Chris Bower, a director of Graham Brown, is confident that there is a need for the scheme. He says: "Many owners are now losing the benefit of their guarantees. Under most home contents policies, the only protection an owner can expect is against fire and theft."

To be eligible for insurance a computer must be no more than two years old at the time the policy is effected. The policy can then be continued until the owner sells the equipment.

More information can be obtained from Graham Brown and Co, Pannells Court, Guildford, Surrey, GU1 4EY.

Micronet adaptor launch soon

THE MICRONET adaptor for the Spectrum is due to be launched. The adaptor will allow users to connect machines to the Micronet system and to use the telesoftware facilities which are available. It will also provide the opportunity to use the thousands of pages on the British Telecom Prestel databases.

The adaptor was due to be launched in May but difficulties arose between Sinclair Research and Martochoice, which was to supply the device.

Prism Microproducts, a sister company of EEC Publications, took over development of the adaptor. Bob Denton, managing director of Prism, says: "The adaptor for the Spectrum is a Prism product entirely."

Martochoice was the joint winner of the Prestel ZX-81 Adaptor competition in 1981. Its adaptor was accepted as the official device for the ZX-81 and the company was to have helped with its manufacture.

The other joint winner was Lion Viewdata. Its device is still available and at £50 is £150 less expensive than that from Martochoice. The features of the Lion device include auto-dialing and automatic identity checking. It has also been modified for use on other computers, including the Spectrum.

It is possible to link the Spectrum to the Micronet system using several interfaces, including the Lion. All members of Micronet, however, have to buy an adaptor produced by the company before they can receive a password and are allowed to enter the system.

The software controlling the Prism adaptor has been designed specifically for use with Micronet and includes the routines to allow a user to enter the system.

Programs programme

BRISTOL-BASED independent radio station Radio West has been transmitting programs for popular microcomputers, such as the ZX-81 and Spectrum.

The transmissions have been made during the station's Datarama program on Monday evenings and after close-down each night.

The programs have been transmitted on VHF/FM and medium-wave frequencies. The VHF transmissions can be received over fairly long distances on a domestic radio receiver with a telescopic whip antenna. Medium-wave transmissions have been used because of problems caused by ground-wave and co-channel interference. The signal has to be strong and clear if it is to be recorded for loading into a computer.

Martin Schimmer, a spokesman for the company, says the broadcasts of computer programs will continue. He says:

"We have so much material that we can go on for a long time. We will continue with the programs until we run out of them."

Datarama covers many areas in computing, as well as broadcasting programs. The programme is broadcast each Monday between 7.30pm and 8pm. Listeners can tune in on 96.3MHz, 230 metres medium wave.

Show date

THE MALVERN Microcomputer Fair will be held at the Winter Gardens, Malvern, Worcestershire on Saturday July 2, from 10am to 5.15pm.

As well as the usual software, hardware and information exchange, visitors will have the chance to sell unwanted programs, books and computers.

DRAFT

A really powerful and versatile computer spreadsheet program for the ZX81 – 16K. Will rapidly give you the answers to almost any type of repetitive calculations on lists or tables of numbers, e.g. maths homework, domestic accounts, school geometry, mortgages/insurance, trade discounts etc. Clear practical style quickly resolves lengthy and tedious calculations. Endlessly useful at home, college and work.

- Up to 80 columns or lines of data.
- Text, formulae, constants and data all fully listable.
- Proper 'report generator' displays any combination of columns on the screen or for printing.
- Range of 21 calculating functions: Arithmetic, Average, Percentage, Group Total, £0.00 justification and all the keyboard scientific and trigonometric functions.
- All reports and listings duplicated on the ZX printer as continuous copy.
- DRAFT files can be 'saved' either full or empty but structured for repetitive later use.
- Detailed instruction manual covers all facets of the program.

The DRAFT cassette and manual together are £7.50 from Myrmidon Software, PO Box 2, Tadworth, Surrey KT20 7LU, or send a stamped/ self addressed envelope for full details.

MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER

THE MICRO POWER SPECTRUM 'ADD-ON'

Bring *'JOY'* to your Joysticks!!
Make your beeps *BEEP!!*

BLADAMM!

BOOM

Create Multi-Channel Sound Effects!!

The new Spectrum Add-On gives you:

- ONE Atari/Commodore type Joystick Port
- TWO Potentiometer Joystick Ports
- Amplification of the standard sound output
- THREE-CHANNEL, PROCESSOR INDEPENDENT, PROGRAMMABLE SOUNDS — music, gun-shots, explosions etc
- Demonstration tape and full operating instructions

Note: The 'Add-On' simply plugs straight onto the back of your Spectrum. No soldering required.

Now offered at the incredibly LOW price of **£19.95** Incl. VAT (Please add 55p Post & Packing).

JOYSTICKS (Potentiometer-Type)
BUILT £7.45 KIT (incl. case) £5.95

MICRO POWER

NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE.
Tel. (0532) 683186 or 696343

BBC, DRAGON & ACORN DEALERS

VISA

MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER

OIL WELL THAT ENDS WELL

Dallas. The task of oil exploration and exploitation in Texas is no game. You'll have to decide how much you'll sell the stuff for – where to find it – how to get to it and where to pump it.
That's just for starters.
Can you take over the Euing Empire or will you be taken over in the attempt?
We've warned you – but then we think you're just about ready for it.

Other titles in the range include Airline, Autochef, Print Shop and Farmer.
Prices: ZX81 and Spectrum 16K £5
Spectrum 48K £6
Available from W.H. Smith and all good computer shops or Dept. S6
Cases Computer Simulations
14 Langton Way London SE3 7TL

Strategic Games. They're no pushover.

A MUST FOR ANYONE INTERESTED IN ZX MACHINE CODE!

The finest range of utility programs for ZX Computers. Used by professionals. Very useful for beginners

ZX SPECTRUM MACHINE CODE SYSTEM
(The key to machine code success)

SPECTRUM EDITOR/ASSEMBLER A powerful and essential machine code programming aid.
16K and 48K on same cassette + full documentation.
Major features: EDITOR with Auto line number and renumber, 40 column screen display, tabulated into fields for easy reading, 5 character label names, easy line editing and cursor control; SAVE/LOAD/VERIFY routines, output to ZX PRINTER. TWO PASS ASSEMBLER accepts all Z80 mnemonics; decimal or hex numbers, simple arithmetic on operands; Assembler Directives — ORG, END, DEFB, DEFW, DEFS, DEFL, EQU, DEFM. **ONLY £8.50**

SPECTRUM MONITOR Machine Code Debug/Disassembler
Enter, Run, Debug M/C programs. Compatible with BASIC. Breakpoints and Registers Display. Disassembler to screen or ZX PRINTER. 16K and 48K on one cassette + 30 page manual. **ONLY £7.50**

ZX81 UTILITIES
(For everyone . . . beginner to professional)

ZX81 REMLOAD Machine Code Debug/Monitor
Explore and master machine code. Compatible with BASIC. CREATE A REM line — any length. BREAKPOINTS & REGISTERS DISPLAY. Fully documented 30 page manual and cassette **ONLY £6.95** 16K to 64K

ZX81 ZX-MC Machine Code Debug/Monitor
The professional one! ENTER/RUN/DEBUG M/C programs. SAVE/LOAD/VERIFY at double speed. BREAKPOINTS & REGISTERS DISPLAY. Self-contained machine code — cannot be used with BASIC. 36 page manual and cassette. **ONLY £7.50** 4K to 64K

ZX81 SCREEN KIT 1 More screen power in your BASIC programs!
BORDERS — any size anywhere on screen. SCROLL in 4 directions. CLEAR and REVERSE part of the screen. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE/LOAD BASIC variables — Double speed. 880 Bytes machine code for instant response. Becomes part of your BASIC program. **ONLY £5.70** 4K to 64K

SEND CHEQUE/P.O. FOR FAST MAIL ORDER!
S.A.E. for full details.
6 Corkscrew Hill, West Wickham, Kent BR4 9BB
*All prices include VAT & P&P.

PICTURESQUE PICTURESQUE PICTURESQUE PICTURESQUE

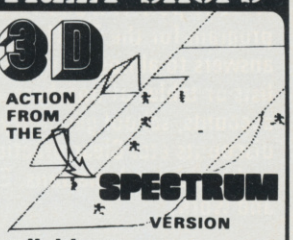
Spectrum Software available from: Buffer Micro Streatham, Microware Leicester. Educational suppliers: Griffin & George

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for **SPECTRUM 48K AND ZX81 16K**



This superb game is **now available** from branches of
W.H. SMITH * and BOOTS.

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:
★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★
★ TRANSFER MARKET ★ TEAM SELECTION ★
★ SAVE GAME FACILITY ★★★ *AND MUCH MORE!* ★★★

WHAT THE PRESS SAY ABOUT IT:—

IF YOU have always wanted to manage a football team,* FOOTBALL MANAGER, *from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
*** SPECTRUM VERSION ONLY.** **ZX COMPUTING FEB/MARCH 1983**

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London)
MICROWARE (Leicester)
ANIROG COMPUTERS (Horley, Surrey)
SUCCESS SERVICES (Walsall)
THE COMPUTER SHOP (Newcastle)
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque P.O. payable to
ADDICTIVE GAMES Dept SU P.O. Box 278
Connilburrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

NEW: Speech & Music for ZX81 & Spectrum!

ZXM SOUND BOX

£29.95

ZXS SPEECH SYNTHESISER

£32.50

- 3 channel sound chip gives a huge range of possible sound effects. Programmable pitch, level, envelope and noise source.
- For the ZX81 or Spectrum - no adaptor needed.
- Just plug it in. Other peripherals or Ram Pack can be plugged into the ZXM.
- Built in amplifier and loudspeaker.
- Audio in/out socket, can be used to amplify the Spectrum 'beep'.
- 9-pin I/O socket can be used with cheap Atari/ Commodore type joysticks.
- Comprehensive manual includes many example routines.

- For the ZX81 or Spectrum - no adaptor needed.
- Let your computer talk back!
- 'Allophone' synthesis gives an unlimited vocabulary.
- Active filtering for improved speech quality.
- Other peripherals or RAM Pack can be plugged into the ZXS.
- Output to normal audio amplifier or to our ZXM Sound Box.
- Manual gives full details on how to use the ZXS, with many examples.

And Don't Forget Our Books;
EXPLORING SPECTRUM BASIC: £4.95 The book of answers. Explains Spectrum BASIC programming techniques in more depth than was possible in the Sinclair manual, illustrated by over 50 full programs. 192 pages.
THE EXPLORERS GUIDE TO THE ZX81: £4.95 The book for the ZX81 enthusiast. Games, application and utility programs plus much useful information on machine code and hardware. "Immediate and lasting value" (PCW).
All prices include U.K. carriage and VAT where applicable. Overseas customers add £1.50 per item for surface mail.
TIMEDATA Ltd. 16 Hemmells, Laindon, Basildon, Essex. SS15 6ED Tel.: (0268) 418121

TIMEDATA

Adaptable RAM pack

IN MAY in the Hardware World article on our RAM-LOK kit the author claims: "The RAM pack can be the only item used on the back of the ZX-81" and later "does not allow for the printer or any other device".

Those two statements are untrue. The fitting of our kit does not prevent the use of any other peripheral. If a ZX printer is used we recommend the use of the optional mounting bracket.

P J Turnbull,
Adapt Electronics,
Buckhurst Hill,
Essex.

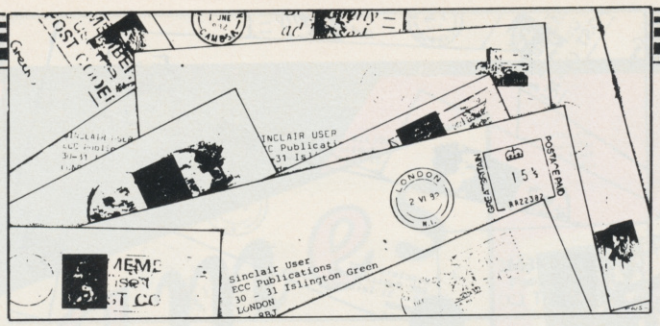
Resistance remedy

THERE HAVE been many complaints about the ZX-81 voltage regulator causing problems. Remedies have been tried, such as cutting extra slots or holes in the case; using thermpath between the regulator and heatsink; drilling the heatsink to increase the dissipation; or even making a larger heatsink.

Those are all remedies which are not totally effective as they aim at easing the symptom, not the cause. Having tried some of the remedies with only minor effect, I measured the voltage from the power unit; it was supplying 10.5V at 550mA, so the poor voltage regulator was having to eliminate 5.5V. I therefore obtained a resistance of 4–5ohms which I placed in the lead and that drops the supply to about 8.5V; the rating of the resistor should be an absolute minimum of 2W, preferably 5W.

The ZX now runs very happily for very long periods and the keyboard is scarcely warm, whereas previously it was hot.

W D Langton,
Midhurst, W Sussex.



Standards begin to fall

AS A REGULAR reader of *Sinclair User* with 11 editions under my belt, you may like to know some of my musings.

The standard of entries is, I am sure, beginning to fall, especially since the still birth of *Spectrum User*. I have owned a Spectrum since October, sweated blood with it in the early days and grown to love its basically good-natured, easy-going ways. It can, however, still be a bit of a pig — and that is where you come in.

You have to provide articles for those still finding their way round the keyboard and they should be of a high order but Sinclair users are growing up and your articles are not.

Now that *Sinclair Programs* is rising to dizzier heights, the listing of programs in *Sinclair User* have become more dross with gloss — no content at all worth incorporating in our programs.

It seems to me that only Hewson's column deserves a gold star, for your reviewers continue *ad nauseum* their soft-in-word-and-head approach to manufacturers' software. Let us see some bloody-mindedness for a change; other magazines do not seem so afraid to bite the benefactor's hand and, let us be honest, some expensive software is dreadful.

Your approach, however, seems to me to be the one Uncle Clive himself employs — shows promise, but exaggerates; misuses people's good nature.

You are spreading the jam too thickly with three magazines — *Sinclair User, Sinclair Programs* and *Sinclair Projects*. You antagonise ZX-81 users with Spectrum articles and vice versa. How about just two magazines — a ZX-81/Timex 1000 magazine with programs, projects, news, views, and a ZX-83/Spectrum/Timex 2000 magazine? No separate programs. Your magazines will be more dedicated, more caring, more user-friendly, more profitable and, as computer succeeds computer, more easy to drop. I am sure Sinclair and his users would approve.

As an educational postscript, how about a listing from another computer — do not say BBC or Atari or Apple or Vic — fully-analysed and translated into a Sinclair Basic listing.

How about a full list of PEEKs and POKEs for ZX-81 and Spectrum on a plastic card and how about help in translating ZX-81 into Spectrumese?

May *Sinclair User* go on and on.

F Duckworth,
Orrell, Wigan.

● *While not accepting the views, we understand that our readers have a variety of opinions which do not necessarily agree with our own. On the point about the numbers of magazines to serve the market, there are two ways it can be done. One is to have a magazine for each computer; the other is to have one for each type of use.*

We think it better to make the split by the type of user — Sinclair User *for the general Sinclair owner,* Sinclair Programs *for the software enthusiast, and* Sinclair Projects *for the person who enjoys building add-ons.*

In that way the magazines can adapt to change rather than launching a new magazine when a new machine reaches the market and disposing of an old one when the machines become less popular.

Figuring on 48K Spectrum

AN EDITORIAL published under the title of Figuring Things Out in the May issue of *Sinclair User* gives a brief account of University Software Library of Advanced Math/Stat/Econ. It is said that the "programs are available for the 16K ZX-81 and the 16K Spectrum. Tape one introduces matrix operations. The second explains polynomials."

From the enquiries concerning this editorial I understand that those three sentences leave the reader with the impression that our programs are not available for the 48K Spectrum and that tapes one and two "explain" only matrix operations and polynomials.

In fact, our range of software is available for 48K Spectrum as well as 16K ZX-81 and 16K Spectrum and tapes one and two are capable of carrying-out all five matrix operations and computing the real roots of polynomials as well as explaining them.

Please note our change of address, which is now 29 St Peters Street, London N1 8JP.

B S Borar,
Managing director,
University Software.

Spectrum versus Oric

REFERENCE John Gilbert's article on the Oric. I wish that people like him would write only informed articles and not the biased bunkum which seems to be the order of the day.

He has not understood how the Oric or the Spectrum works. His comment on saving variables — Spectrum uses LOAD DATA — the Spectrum has two facilities with variables; they can be saved with the program as per the Oric, or separately as a data file.

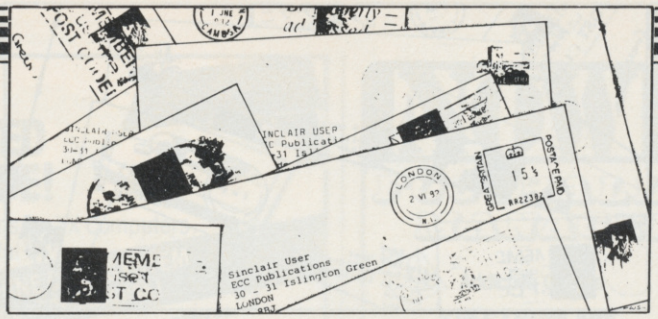
He says that the Oric has two modes of display, hi-res and normal. So has the Spectrum and it is easier to use — the Oric has a peculiar additional screen flash when cleared. He has also skipped over the main display problem with the Oric where the ATTRibutes file and screen file are mixed, making a very complex colour set up when printing moving CHRS on the screen. I could go on and make a large list of items where the Oric does not even begin to compare to the very friendly Spectrum.

B G Cornhill,
Aylesbury,
Bucks.

● *We agree that the Oric is not as user-friendly as the Spectrum but think that the reader has misunderstood the purpose of the article, which was to give an objective assessment of the Oric.*

The Oric, which is more memory-efficient than the Spectrum, has two types of main screen format. You can switch between text and high-resolution graphics to use memory either for program and data or display. On the Spectrum you cannot do so and 7K of memory is always used for the high-resolution display.

Letters should be kept as brief as possible and addressed to The Editor, Sinclair User, *30-31 Islington Green, London N1 8BJ.*



Testers for disabled aid

PLEASE ACCEPT my apologies. Some time ago I bought your magazine and felt that it left much to be desired. I was not impressed by the standard of materials or articles used. A short time ago I purchased the April edition and now believe I was over-critical and allowed my judgment to be clouded by snobbishness. I found the issue an excellent read and it contained some very good information.

One article in particular caught my imagination — Disabled Aid brought to my attention the need for modern technology to be adapted for people with serious disability of the body but very intelligent and active minds. I was so motivated that I immediately set about writing a program to achieve a similar end to that of the Regis Amateur Micro Society.

The thought which occurred to me was that if a program could be written which required only one key to operate, then anyone with any movement in any part of the body could use the ZX-81 to communicate, write letters, or — in the case of a second mode in my program — to draw pictures.

I have since spent a number of hours writing a program which goes a long way to meeting those needs and includes some extra facilities. I require one or more such disabled people to test the program and the ease of adaptability.

My services to any of the people will be voluntary and my only aim is to give such disabled people a means of communicating easily with others at the price of the cost of a cheap micro — the program should be easily adapted to other micros — and such peripherals as may be necessary so that programs may be entered and saved, and that printouts may be made.

Peter Doherty,
15 Wilkinson Road,
Elsecar, Barnsley.

Radio hams united

CONGRATULATIONS on a well-presented and informative magazine. One area which is neglected is the amateur radio operators of the world. Most amateur operators are moving into the world of computers and the ZX-81 and Spectrum have the potential to open a new and exciting area of computing.

At the moment I am building a Morse code reader to interface to my 64K ZX-81 using a tone decoder and A/D converter.

I would like to hear from other readers who have information on Morse code readers or RTTY decoders suited to the ZX-81.

Is it possible to include perhaps one project per issue into *Sinclair User* as you do with program printout?

Daryl Ravenscroft,
Bougainville Island
Sinclair Users' Group,
PO Box 647,
Arawa, North Solomons
Province,
Papua New Guinea.

Hooked on Sinclair

I BEGAN using my Spectrum and I discovered *Sinclair User* when a friend who also owned a Spectrum introduced it to me. Now when I read one month's issue I seem to enjoy it so much I cannot wait till the next month's is published. I would like to thank and congratulate the publishers of such an excellent magazine and it pleases me to think that owners of ZX computers can rely on *Sinclair User* for important and entertaining monthly news.

Prabhoo Janabalan,
London E9.

Scrolling for the Spectrum

I HAVE discovered a scroll trick for the Spectrum. While the computer is printing-out a line a certain number of times it rather spoils it if the question "scroll?" appears at the bottom of the screen. I have overcome this simply by inserting the line INPUT INKEY$="y" so the whole screen is scrolled up.

Also I have a small program which prints-out a name 100 times in a sloping line:

```
 5 BORDER 2: INK 7: PAPER J
10 INPUT "Your name?";a$
20 FOR n=1 to 100
30 PRINT TAB 17*n;a$
40 INPUT INKEY$="y"
50 NEXT n
```

Timothy Richardson,
Quarndon, Derbyshire.

Virgin Games

A name to PLAY with

YOMP (Spectrum 16K & 48K) **COMMAND THE PARAS AND TAKE ON THE IMPOSSIBLE** by T. Murray & R. Poole **VGA 1001**

GOLF (Spectrum 16K & 48K) **CHAMPIONSHIP GOLF IN YOUR OWN HOME** by David Thomson **VGA 1004**

SHEEPWALK (Spectrum 48K) **A SHEEPDOG TRIAL IN YOUR LIVING ROOM! IT'S A ONE-MAN SHEEPDOG TRIAL** by Gregory Trezise **VGA 1003**

STARFIRE (Spectrum 48K) **RID THE GALAXY OF THE XTARDAN BATTLE CRUISERS – A GAME OF STRATEGY AND SKILL** by Martyn Davies **VGA 1002**

VIRGIN GAMES GANG

- **With each title you buy before the end of August you get:–**
- 1. An offer of **One Year's Free Membership** of **The Virgin Games Gang.**
- 2. **Free Entry** into **The Virgin Games Gang draw** on September 6th.
- **First Prize – £500 of computer hardware or software** of your choice
- **Second Prize – £100 of computer hardware or software** of your choice
- and **150 runner-up prizes** of **Virgin Games T-shirts or posters.**
- 3. A **Specially mixed** piece of **music by Steve Hillage** – to **play** while you **play.**

- If your local retailer is not yet stocking **Virgin Games** – tell him he should be – but, however, you can order direct from **"I've got no good local retailer" dept, Virgin Games Ltd, 61-63 Portobello Road, London W11.** enclose a cheque or postal order for **£7.95** for **each title** you want and don't forget to put your name and address – people do you know!
- **Allow up to 28 days for delivery before complaining.**
- **Don't forget,** if you want to make some money to buy some games from us or do whatever else you get up to and you have written an original games program, with good graphics for any of the popular home computers other than the ZX81, **send a cassette version to us – it could make you rich.**

£7.95

Computer FUN... available NOW!

AGF

PROGRAMMABL

JOYSTICK INTERFAC

for

sinclair ZX Spec 81

TOTAL SOFTWAR
COMPATIBILITY!

ABOUT OUR PROGRAMMABLE INTERFACE

Surpassing the outstanding specification of our Interface Module II which still offers the best software support at its price, a Joystick Interface that is compatible with ALL SOFTWARE through its unique hardware programmable design.

The Interface plugs on to the rear connector of your ZX81 or ZX Spectrum.

Quick clip-on connections, which are configured from a reference card supplied, allow you to define which of the forty keys are simulated by which action of the Joystick. A pack of ten Quick Reference Programming Cards makes setting for your favourite games even easier. These can be filled in to show at a glance the configuration required and stored in the cassette case of the particular game. When you change to a game using different keys the module is re-programmed in a few seconds.

As with our Interface Module II the Programmable Interface accepts all standard switch Joysticks that are Atari-compatible. Two sockets are available which are connected together for two player games which use the same keys for both players.

The Interface resides in the keyboard address space and does not affect its operation or interfere with any other add-ons. A rear extension edge connector will accommodate expansion of your system.

The unique AGF key simulation principle makes it extremely easy to incorporate Joystick action in your own programs. All eight directions and fire are read by simple BASIC.

With every order comes a free demonstration program called 'Video Graffiti' plus a full set of instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

JOYSTICKS

ATARI CONTROLLERS

FOR USE WITH OUR INTERFACE or Atari VCS, Atari 400, Atari, 800, VIC 20, Commodore 64.

If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

ONLY 32.95 +£1.00pp

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. ONLY TO: A.G.F. HARDWARE, DEPT. SU

26 VAN GOGH PLACE, BOGNOR REGIS, WEST SUSSEX PO22 9BY

QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	33.95	
	JOYSTICK(S)	7.54	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ONE	VIDEO GRAFFITI	FREE	
ZX81 ☐ ZX SPECTRUM ☐ Please tick		FINAL TOTAL	

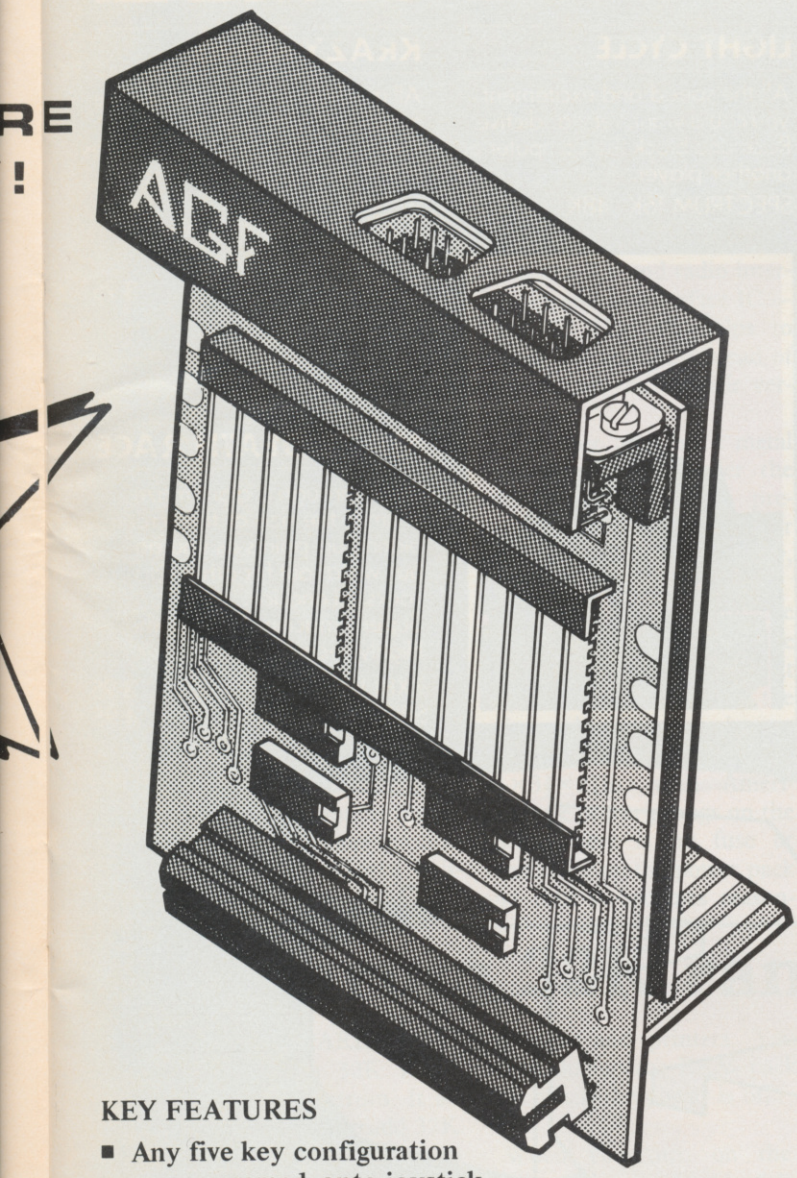
DEALER ENQUIRIES WELCOME *EXPORT PRICES ON APPLICATION*

BLE
CE

NEW!

ectrum

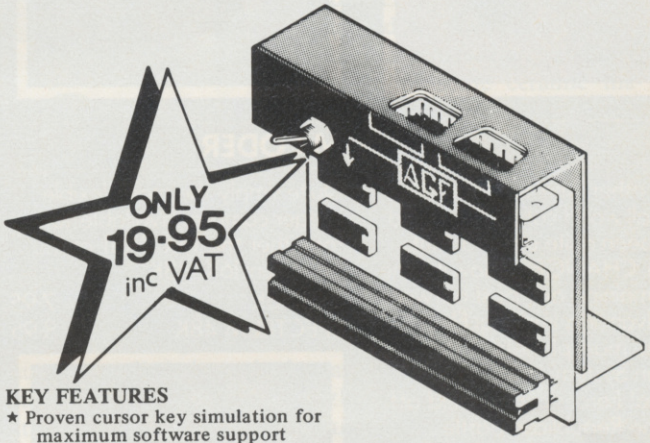
RE
!



KEY FEATURES

- Any five key configuration programmed onto joystick
- Accepts all Atari-compatible Joysticks
- Rear connector for any other add-ons
- Use will not affect Sinclair guarantee
- Full instructions & 12 month guarantee

JOYSTICK INTERFACE II for sinclair ZX Spectrum 81



KEY FEATURES

- ★ Proven cursor key simulation for maximum software support
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick, etc.
- ★ Second Joystick facility
- ★ Eight directions programmed in simple BASIC
- ★ Rear extension connector for all other add-ons
- ★ Free demo program, 'Video Graffiti' + full instructions

JOYSTICKS
ATARI CONTROLLERS
FOR USE WITH OUR INTERFACE
Module II or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800
If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks
ONLY £7.54 inc VAT + P&P

INTERFACE II COMPATIBLE SOFTWARE

ZX SPECTRUM

Abbex ...	*	Spookyman
	*	Invasion
	*	Harrier
	*	Cosmos
	*	The Android Run
	*	High Noon
	*	ETX
Abersoft ...		Mazeman
		The Wizards
		Warriors
Apocolypse Software ...		Galactic Jailbreak
Axis ...		Labyrinth
Blaby Comp. & Vid. ...		Chopper Rescue
		Gold Digger
		Confusion
Campbell Systems ...		Gulpman
CDS Micro Systems ...		Leapfrog
C.Tech ...		Specman
DJL Software		Froggy
DK 'Tronics	☐	3D Tanx £4.95
		Meteoroids
Hewson ...		Nightflite
Consultants		Specvaders
		Mazechase
ICL ...		Star Trail (Man.Dock)
Imagine ...		Zzoom
Micromania		Ghost's Revenge
New Generation Software	☐	Escape £4.95
	☐	3D Tunnel £5.95
Newsoft ...		Time Bandits
Products		Spectral Maze
Psion ...		Flight Simulation
		VU–3D
Quicksilva		Meteor Storm
		Space Intruders
R + R ...		Gnasher
Software		Spectapede
Silversoft ...		Ground Attack
	☐	Cyber Rats £5.95
Vectis ...		Pony Express
Software		Vec-Man

LATEST ADDITION

New Generation Software
☐ **Knot in 3D £5.95**

"PLUS 21 ZX81 Titles"

* *State "AGF version"*

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. SU
FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

QTY	ITEM	ITEM PRICE	TOTAL
	INTERFACE MODULE II	20.95	
	JOYSTICK(S)	7.54	
	SOFTWARE AS TICKED ON LIST		
	SOFTWARE AS TICKED ON LIST		
ZX81 ☐	ZX SPECTRUM ☐ Please tick	FINAL TOTAL	

DEALER ENQUIRIES WELCOME *EXPORT PRICES ON APPLICATION*

P.S.S. THE FUTURE MAKERS
FANTASIES FOR ZX81 AND SPECTRUM

TAI

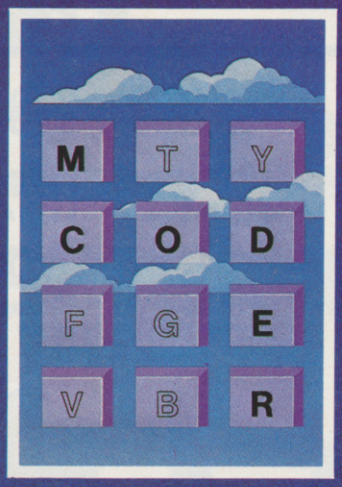
In any other time or galaxy, the dust ball world called TAI would have been quite unimportant. TIMES CHANGE.... Now it is the last remaining out-post between the advancing Imperial Fleet and the main planets of the Dorfian System. Unless the Imperial Forces can be held off untill the Republican battle fleet arrives, an entire civilization will be betrayed.... You have been chosen to defend TAI. The Galactic future depends on you.

ZX81 16K 4·95

HOPPER

Can you help Fergy and his friends get across the 4 lane highway and back to the lilly pond?
Includes Crocodiles, Logs, varying traffic speed etc.

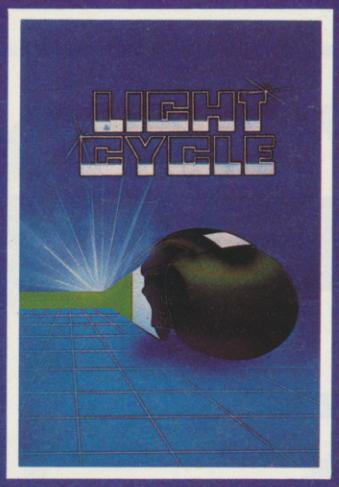
ZX81 16K 3·95



M CODER

Quite simply the most flexible integer compiler available today for either the 16K ZX81 or the Spectrum16K/48K.

ZX81 16K 7·95
SPECTRUM 48K 8·95



LIGHT CYCLE

All the speed and excitement you could want, very addictive. Race and block the computer or another player.

SPECTRUM 16K 48K 4·95

KRAZY KONG

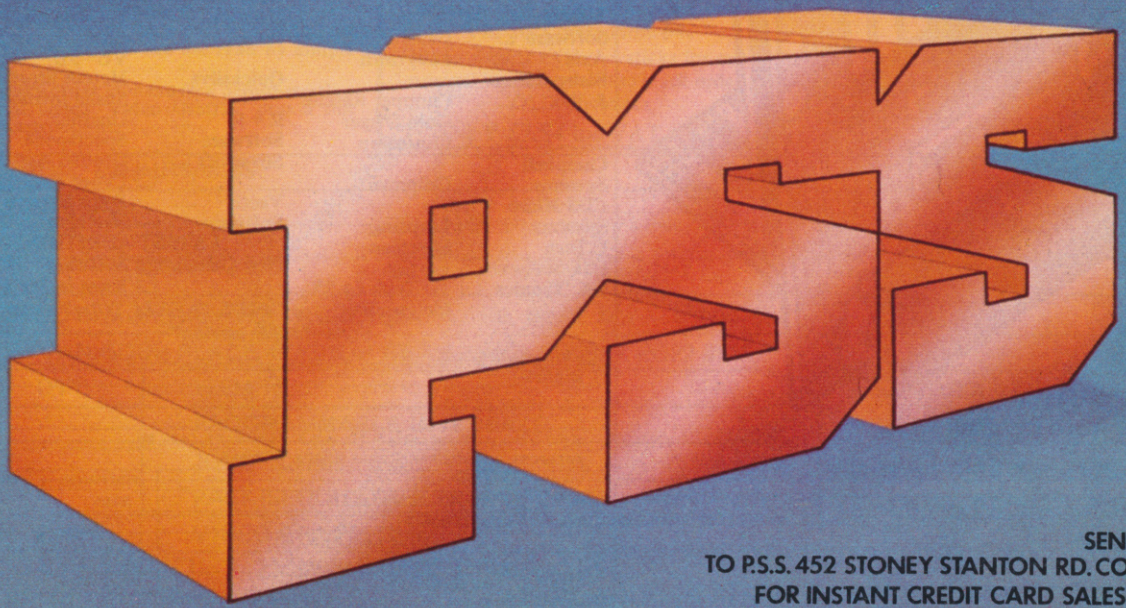
All machine code version of the popular arcade game.
This program has all the features of the original and is every bit as fast.
3 different screens make it difficult to beat.

ZX81 16K 3·95

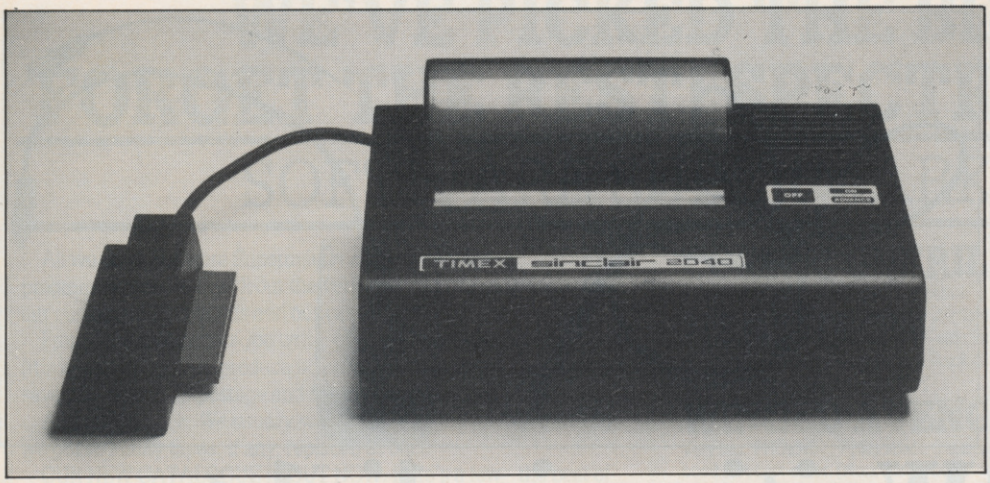
MAZE DEATH RACE

Drive through a giant maze, 9 times the size of the screen picking up points as you go – but watch out for other cars rocks, oil and ice.
Superb machine code game.
Highly recomended.

ZX81 16K 3·95
SPECTRUM 48K 4·95



SEND CHEQUE OR P.O.
TO P.S.S. 452 STONEY STANTON RD. COVENTRY CV6 5DG.
FOR INSTANT CREDIT CARD SALES TEL (0203)667556
TRADE ENQUIRIES CONTACT JOHN FLETCHER, COVENTRY (0203) 667556



Timex makes a clearer printer

THE TIMEX 2040 thermal printer is the standard printer used with the American version of the ZX-81. The U.S. version of the Spectrum had yet to appear at the time of writing. It works with a different paper, 4½in. wide plain white paper with a special coating sprayed on to the top of it. The coating turns black when heated, giving the impression of ink on the paper. It is much clearer and there is no difficulty with the paper sticking.

The case is 7¾×5¾×3½in. high in moulded black ABS plastic and has a 6in. long cable at the back on the left-hand side. The connector to the end of the cable is bigger and more solid than the Sinclair version, having a half-inch hump at the top.

That hump contains two ferrite rings around the cable to reduce TV and radio interference and an interface IC — 74LS10. That IC helps to decode A7 and A2 instead of only A2 on the Sinclair version.

The case also has a metal comb protruding under the edge connector which prevents the edge connector wobbling and, presumably, the RAM pack, too.

Also on the back of the case is a power socket like that of the Spectrum but it requires 25V AC to run the printer. A transformer is supplied in a plastic case 2½×3½×2¼in. with American-type power prongs on the back. There is no fuse or ventilation on the power pack and thus it becomes reasonably hot but it has not failed yet. The Sinclair printer is, of course, supplied through the computer and thus needs no extra power supply.

Inside the printer there are two regulators, one a transistor arrangement for the 25V DC supply to the heated pads which do the printing and a 7805 IC of the ZX-81 type fitted into a large heatsink and situated under a ventilation slot in the top. The power supply is set for 110V AC and therefore should not be used without a stepdown auto-transformer to convert the voltage from 240V supply.

There are two switch pads mounted in the top of the box which push two flat switches mounted on the PCB underneath; they turn the printer on and off. Pushing the off button while holding-down the on button puts the printer into a self-test mode, printing alternate lines of 1s and 8s independent of the computer.

The other electronics inside the printer are five driver ICs, one for the motor and four for the heated pads. There is also a pre-programmed ROM 8741 which controls all the printer operations.

The pads on which the printer depends are spring-loaded on to a rubber platen, like a typewriter, and are made of some ceramic material on which 20 copper wires have been plated. There are two pads and each wire will print over one character area, so theoretically there should be 40 characters but you get only 32. The pads move from side to side while printing, controlled by a nylon gear arrangement, so that 32 dots are printed at one time.

The printing head is then moved on to the next 32 until all eight dots on each character line have been printed before moving to the next line. The printing speed is very fast; on self-test you can print 124 lines a minute.

The paper roll used in the printer is inside a perspex cover and the start of the paper is pushed under the platen; the on button is then pushed to feed through the paper. The paper appears on the outside of the paper-holder on the other side of the ¼in. platen. The platen cannot be pushed in reverse, so the only way to free jammed paper is first to cut it and then push the platen forward, using the motor drive if possible.

The printer is considerably easier to use than the Sinclair one and the paper is much cheaper at $1.50 (£1). The printer costs $99. The one tested was sent by a friend in the U.S. and it cost $99 plus $23.90 postage — £81.67 — plus £14.13 Customs duty, a total of £95.80.

More hardware page 24

Spectrum 32K rampack

CHEETAH MARKETING has produced a 32K RAM pack for the Spectrum. It allows the 16K user to add 32K of memory without having to go inside the computer. The front of the RAM pack is designed to fit tightly on to the back of the Spectrum and an expansion connector is provided at the back for Microdrives and printers. You must plug in the RAM pack only when the power is off.

When you turn on the power again you have a full 48K just as if it was inside. The RAM pack does not wobble and apart from the fact that it protrudes over the back of the Spectrum, you would not know it was there. Cheetah gives only a three-month guarantee and you must pay a handling charge of £1.50 if you return the unit for repair.

Cheetah Marketing is at 359 The Strand, London WC2 0HS. Tel: 01-240-7939. The cost of the RAM pack is £39.95.

EPROM toolkit

ROM V is the latest in a salvo of solid state software as the Americans call it — EPROMs — from Eprom Services. It contains a disassembler in a 2K EPROM for the ZX-81. It requires an EPROM board to fit it into but any one will do so long as it allows the EPROM to reside between 8K and 10K.

On RAND USER 10000, it displays a menu of the six commands. All the commands have a description of its use and the letter to use for that command. It can disassemble from any address, including that of its own ROM, print-out or COPY the disassembled program — the printout goes on past a full screen — or jump back to the start of disassembly.

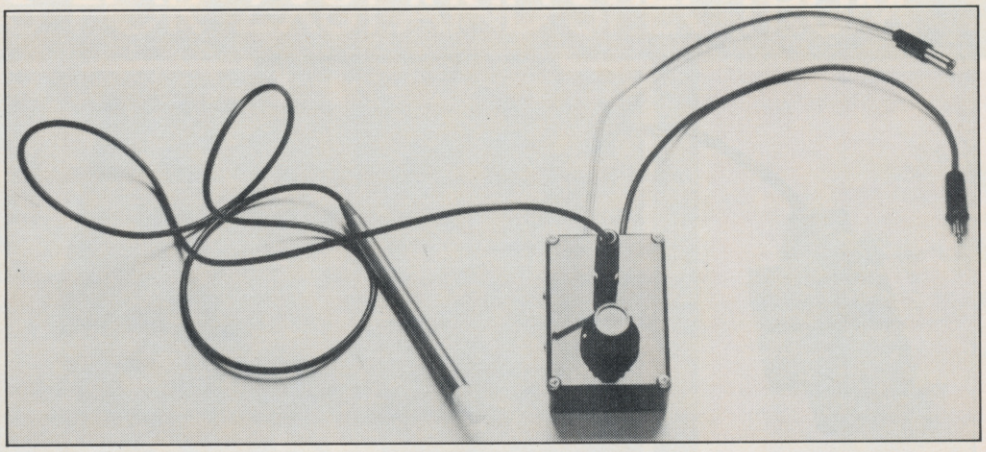
Pressing any key brings up a new screen full of disassembled mnemonics with their hex equivalent and address on each line. All information is put in as hex numbers; decimal is not accepted.

It provides a very useful facility in ROM which is a good aid when faulting or checking a program. It uses no memory apart from the screen and therefore can be used on a 1K machine or a 16K version; being EPROM it is also crash-proof.

A break or Q key can be used to return to Basic at any time. Eprom Services is at 3 Wedgewood Drive, Leeds LS8 1EF. Tel: 0532-667183. The ROM V costs £10.

ZON-X is now fully-decoded

BI-PAK says that its Spectrum version is fully-decoded and checks that none of the Sinclair devices is working before operating the ZON-X sound board, including the Microdrive. The confusion arose because of the manual description, which was out-of-date.



Writing in light makes input easier

THE SPECTRUM Light-pen by dK'tronics is a kit consisting of a tape, light pen with a 3.5mm plug on the end and a black plastic box. First you run the tape into the Spectrum; the 48K side unfortunately has the 16K version on it and vice versa so if you get out of memory, pull out the plug and start again on the opposite side of the tape.

The program loads a Basic instruction program which then loads a machine code program above RAMTOP. All goes well to that point. The instructions on the screen then warn you to plug the light pen via the control box into the computer. The power lead must be diverted through the box when you power-up the computer but the light pen must be disconnected while LOADing or SAVEing. The list of instructions is vast and all letter-coded.

Choosing a letter from the menu gives the instructions associated with that letter. Having gone through the instructions, you have to set up the delay for the screen. That is the first bit of machine code and immediately crashes the program on the 48K version. On the 16K version there is no list of instructions — they are listed in the manual.

The light pen works well; it reacts with the instructions satisfactorily. The position of its reaction can be adjusted up or down by a knob on the top of the unit. That varies the pulse sent to the EAR socket by the black box.

dK'tronics light pen costs £21.20 and is available from Unit 2, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AX. Tel: 0709-236350.

Versatile controller

THE PICKARD controller is a plastic box through which you can connect an Atari-type joystick to the Spectrum or ZX-81 keyboard. That allows you to specify which key the joystick will operate by a set of plugs on the top of the unit which represent the joystick position.

They plug into a socket — just like a MIC socket — which represents the key you want to operate. That permits you to work a program through the joystick now, or in the future. It also provides you with other uses such as quick editing, having the computer react to outside events by plugging-in a switch instead of the joystick plug, and many other things.

The unit plugs into the keyboard sockets of the computer and into the power socket of the ZX-81 or Spectrum — you must state which when ordering. The power unit then plugs into the joystick box. The keyboard leads plug into a keyboard socket on the top the keyboard plug but that may be changed so that you do not have to remove the keyboard leads.

Difficulties with the unit were caused by what appeared to be careless construction.

According to the supplier those checks will be tightened and the review unit appeared to be a rogue one. The unit is also being changed to make it easier to construct, which at present is a time-consuming operation. It is a very good idea; once the unit was soldered-up it worked perfectly. Once the construction problems have been solved, it should be a winner.

The unit is marketed by Success Services, 154 High Street, Bloxwich, Walsall, West Midlands WS13 3JT and costs £20.45 for the controller and £7.50 for the joystick. You must state on which machine you want to use it.

WE'VE PICKED THE BEST, FORGET THE REST! SPECTRUM/ZX81

SOFTWARE SUPERMARKET

All we do at Software Supermarket is play every Spectrum/ZX81 program we can find, pick out the very best and offer only those to our customers - in our ads and our catalogues.

From over 30 countries you write, praising our free selection service (it's impartial, too: we produce no programs ourselves). You say we save you plenty - in postage and mistakes.

And we're quick. *We usually send your order out on the same day we get it.* Faulty tapes, if any, replaced at once.

OUR NEW CATALOGUE IS OUT NOW. Here's a few - the best of the new, the all-time greats. Free catalogue with every order. You've got a great computer: we've got the great programs.

Mail order only, please. If we had to run a shop, we wouldn't have time to run all the programs.

48K SPECTRUM ONLY

LET 'E.T.X.' TALK TO YOU The clearest speech we've ever heard in this *"adventure/graphic arcade game utilizing every byte of computing power in the Spectrum" (Abbex).* Enchanting graphic adventure: 16 landscapes: 1400 power zones: 4-levels: 16-page on-screen manual: up to 9 players: it's amazing what a Spectrum can do. (Abbex) £5.95

TRANSYLVANIAN TOWER *"Enthralling and addictive" (PCW). An excellent game at a reasonable price" (PCN).* Stunning 3D graphic adventure. Fight (and shoot) your way through the 500 3D rooms in Count Creepie's castle. Combines adventure and arcade games with great skill. We can't give it up! (R. Shepherd) £6.50.

KNOT IN 3D Brand new mind-boggler from the author of 'Escape' and 'Tunnel'. Absolutely brilliant. Untangle yourself - or get knotted. Avoid collisions: worry about the chasers as you roam through an apparently empty 3D space. But is it? Are you? (New Generation) £5.95

BLACK CRYSTAL *"An excellent graphics adventure" (S. User).* The massive 180K of program, 'loads' from 2 cassettes in 6 chapters. You must solve each of the 6 stages to defeat the Lords of Chaos. Real-time monster battles, 16 command keys. Instruction manual, (Carnell) £7.50

THE HOBBIT *"Takes first place for quality and value for money" (S. User) "A marvellous game...should set the standard" (ZX Comp).* Free 285 p illustrated book contains clues to help you. 30 beautiful full-screen pictures; 500 word vocabulary; 16 page instruction manual: it took 4 people 18 months to write! (Melbourne House) £14.95

PENETRATOR *"The graphics are truly impressive... definitely in the top 5" (CVG).* The most sophisticated 'SCRAMBLE' ever. Demo. Training programs. Plus amazing Customizing Mode lets you build your personal 'Scramble'. Write your own unique arcade game - without all the effort! (Melbourne House) £6.95

TRADER *"Great fun...much more entertaining than the usual adventure" (Your Computer).* Great spaceships, pretty maps, animated graphics - a big adventure that loads in 3 parts. *"Outstanding" (P.C.T.).* (Quicksilva) £9.95

PIMANIA *"Amusing and brilliant...the graphics are excellent" (S. User).* A wonderfully witty adventure, great graphics and music and you could win the £6,000 Golden Sundial of Pi. (Automata) £10.00

ANY SPECTRUM

FROGGY The best frog there is, we reckon. This game uses so much memory, you even have to unplug your printer. Loads in 2 parts. As you get better, the game gets harder. Just great. (DJL) £5.95

ARCADIA *"Stunning graphics have no equal" (S. User). "In the top 3 arcade games" (ZX Comp).* The most aliens you've ever met. Move in 4 directions to avoid them. Choose your own keys. Incredible. (Imagine) £5.50

GALAXIANS *"The graphics are very good" (C & VG)* Makes a lot of invaders-style games look old-fashioned as the Galaxians swoop down to get you! 1 or 2 players: 9 skill levels: bonus base: pause. (Artic) £4.95

JET-PAC Absolutely brilliant graphics from a new company. Control your test pilot spaceman with his jet-pack as you build your spaceship, fuel it up and take off for a new planet. All the time avoiding the nasties and collecting treasure! Wonderful! 1 or 2 players. Keyboard or Kempston joystick. (Ultimate) £5.50

COSMIC GUERILLA Yet another mind-bending variation on Invaders. 4 game options: 6 skill levels for each gives you 24 games in 1. Will make your wrist ache. (Crystal) £5.50

HEATHROW Air Traffic Control. If you've outgrown your flight simulator, get in charge at Heathrow. Land your planes safely using your radar and stack displays. Watch out for rogues. 7 skill levels, including demo. (Hewson) £7.95

WINGED AVENGER *"Hard to beat" (CVG). "One of the best Sinclair games so far" (PCW).* Very fast 'PHOENIX', 7 play levels, 3 attack waves, laser shield: mothership with smart bombs. A best-seller. (Work Force) £4.50

3D TUNNEL *"Superb graphics and game presentation" (CVG).* Fly down the winding 3D tunnel, shooting bats, spiders, frogs and rats. Demo mode: 3 speeds: training program for each phase. (New Generation) £5.95

3D TANX Shoot the enemy tanks from your moving 3D turret. 3-play levels: accurate ballistics: 1 or 2 players: pause: demo game: training program: even plays God Save The Queen. (DK'tronics) £4.95

FAUST'S FOLLY The first adventure we've seen that's worth playing in 16K. It's great and it's graphic! Loads in 2 parts: clear instructions: then a smashing adventure with directions, inventory, look, score, save. (Abbex) £5.95

ZX81 OWNERS

Special 16K ZX81 versions of 6 of these programs are available. Use the coupon to order. Free catalogue with every order or phone for catalogue only

BLACK CRYSTAL	**£7.50**	**WINGED AVENGER**	**£4.50**
TRADER	**£9.95**	**FROGGY**	**£5.95**
PIMANIA	**£8.00**	**GALAXIANS**	**£4.95**

CHARGE PROGRAMS TO ANY VISA CARD
CALL 01-789 8546 (24 hours)
Leave name, address, computer type, card number.

To: Software Supermarket, 87 Howard's Lane, London, SW15 6NU.

If you do not want to cut this magazine, write your order out carefully on plain paper and quote this number **(SU8)**

I own a 16K Spectrum ☐ 48K Spectrum ☐ 16K ZX81 ☐ (please tick).

I enclose my Cheque/PO for £.....payable to Software Supermarket.

Please use block capitals. If we can't read it, you won't get it.

Name .....

Address .....

.....

..... Postcode .....

Phone, if any, in case we have a query .....

Program Name	Computer	Price
		£
		£
		£
		£
		£
		£
POSTAGE AND PACKING	U.K. Add 55p only per order	£0.55p
	EUROPE. Add 55p for each program	£
	OUTSIDE EUROPE. Add £1 for each - program airmail.	£
	TOTAL	£

A good idea worth sharing. Custom Keypanel Kits for the Spectrum and now the ORIC

Put everything you need on the keyboard with a Custom Keypanel Kit.

Precision die-cut panels fit perfectly over your keyboard and create an instant and individual reference to all your software.

Each kit comes in a clear plastic wallet and contains: 10 matt black Keypanels plus sheets containing over 140 self-adhesive command labels, pre-printed with words and symbols – arrows, left, right, FIRE!, POWER!, etc, plus a sheet of blanks for your own designs.

SPECTRUM Keypanels (96 x 224mm)
Self-adhesive label sets are printed in 'Spectrum' bright red. A must for flight simulation and all multi-key games and applications, the first add-on for your Spectrum.

ORIC Keypanels (105 x 275mm)
Self-adhesive label sets are printed in 'ORIC' light blue. Master those CTRL and ESC key combinations and create a reference to all ORIC's keyboard functions.

NOW in super ML PLASTIC.

We despatch to you first class post by return*.

*Subject to stock availability

Post today to **Softeach Limited**, 25 College Road, Reading, Berkshire, RG6 1QE.

Please send me:

..... Spectrum Keypanel Kits at £3.95 + 35p p&p each (overseas should add 25% for additional surface mail)

..... ORIC Keypanel Kits at £4.95 + 35p p&p each (overseas should add 25% for additional surface mail)

I enclose a total remittance of £..... cheques/postal orders payable to **Softeach Limited**.

NAME .....

ADDRESS .....

.....

SU JU3

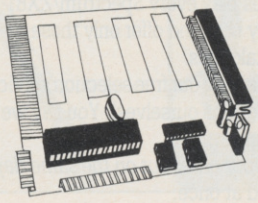
FB tronics SPECSPANSION

A combined 4-slot motherboard and 24-line bi-directional programmable portboard, supplied with a comprehensive User Manual.

A software programming aid, on cassette, is also available.

Plugs directly into the Spectrum, no extra connectors required. ZX printer and other periphrals can be plugged onto the board's edge connector.

Port connections via edge pins, either solder direct or, we recommend, use sockets which can be supplied.



On Board +5 volts regulator.
Built in address decoding available at three of the motherboard slots for up to a further 12 ports. Manual gives details of addressing.
Provision for 4 additional cards, either your own or, coming soon, RS232/centronics interface, A to D converter, relay box interface, Joysticks.

Upgrade in stages, the board can be supplied drilled only to take the additional connectors later on with one or more of the connectors fitted as required.

Prices:	
Port/motherboard drilled only	**£18.50**
Port/motherboard fitted with additional connectors (up to 4), per connector, add	**£3.50**
Motherboard connectors loose, per connector	**£3.00**
Port sockets, per set of 6	**£1.40**
Programming Aid cassette	**£3.50**

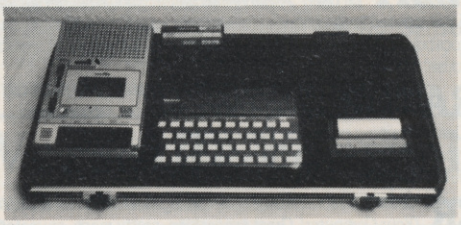
For boards, add 80p postage and packing; for other items, add 40p. Orders dispatched within 48 hours.

Dept SU
F B Tronics, Unit 2, Park Brook Industrial Estate, Park Street, Lye, Stourbridge, West Midlands, DY9 8SS

Take YOUR COMPUTER with you to the CLUB — SCHOOL — OFFICE

SPECTRUM/ZX81 MICROCASE

Turn your Sinclair computer into a portable system with the benefit of CONVENIENCE — PROTECTION — SECURITY



from only £28.95 inc. VAT

This smart, neat case is designed to hold your computer, power supply, printer, rampack etc. and has space for your own cassette recorder or microdrives. All firmly held in place. Wires hidden. Cable faults reduced.

The shallow tray containing the system is only 35mm deep forming an attractive desk console. The detached lid provides your TV stand. When closed this smart, lockable, lightweight, professional case can be carried with ease and confidence. Your system is operational in seconds, wherever there is a power supply.

SEND FOR YOUR MICROCASE/CONSOLE NOW!

Name ..... please supply by RETURN of POST

Address.....

.....

.....

Tel.....Date.....

Either use this form or write quoting ref. MC/SU1

Qty	Model	Price	Total
	Spectrum	£29.95	
	ZX81	£28.95	
	carriage	£2.50	
	Cheque/PO to Micro Aids		

MICRO AIDS, Freepost, 2 Boston Close, Culcheth Warrington WA3 1BR. Tel: 092 576 2613

Many other microcases available BBC/Dragon/VIC/Oric/Texas etc.

Damping-down lively cables

FEW NEW GAMES for the ZX-81 have been released recently. Only two of the major software companies have continued their range of cassettes for the machine. The first is Quicksilva, which has launched a new batch of games for the 16K ZX-81. They include a cassette containing two arcade-type games and two adventures.

The first game on the arcade tape is **Damper.** The player takes the part of a grid damper who must turn off the power on a grid before some evil leeches do permanent damage to the power cables.

To attack the leeches you must trace round the squares which make up the grid. When you have completed a track round a square it will turn black as the power runs down in that sector of the grid. If the leeches catch your player you will have an electrifying experience.

The game includes a hall of fame. The only problem is that you are usually dead before your name is entered with the others of the elite of grid runners.

Damper is an original and excellent game and includes some stunning graphics.

Also included on the tape is a Pac-man-type game, **Glooper.** There are seven levels of play and the seventh is very fast. The ghosts which inhabit the maze are intelligent, for a change, and they will always get the Pac-man on the most difficult level. Both games are available on cassette for £4.95.

The first of the adventures from Quicksilva is **Pioneer Trail.** The year is 1842 and you and your family join the pioneer trail to Oregon from Westport Landing, Missouri. You have 40 weeks to cover 2,000 miles and all you have for support is two tired horses and a wagon.

At the start of the game you have $700 which you can spend on oxen, food, bullets, clothes and supplies. You can use the bullets to hunt or you can drop into the local fort for extra supplies on the journey. Along the way you will meet Indians and have to fight your way through thick fog and blizzards.

Pioneer Trail costs £3.95 and includes both adventure and arcade graphics.

The other adventure is **Ocean Trader.** The game is again set in the 19th century. You are the captain of a 130-ton sailing barque who must gain £500,000 before the game is completed.

You can hold 50 units of cargo aboard the vessel, including arms, coal, whisky and bullion. The arms and bullion are, of course, illegal and will have to be jettisoned if you encounter trouble and have to return to port. The dangers of your voyages between the ports of Liverpool, London, Newcastle and Southampton include sea mists, pirates and freak storms. There is also the danger of having to pay the loan for your ship when you have no money. If that happens you could lose your ship. Ocean Trader costs £3.95. All these games are available from Quicksilva Ltd, Palmerston Park House, 13 Palmerston Road, Southampton.

Tempestuous action from Mikro-gen

MIKRO-GEN is the other company which is still retaining games for the ZX-81 sector of the market. Its releases include an excellent version of an arcade game called **Tempest** for the 16K ZX-81.

Your ship is at the top of the screen and a host of invaders shoot across from the right-hand side. You have to destroy them without hitting the missiles which are launched against you or the devilish spikes which trail behind the spinners.

The game is played through different levels or sectors. When you have destroyed all the aliens in one sector your ship will move to the right of the screen and into the next sector.

The playing level numbers are arranged in odd order, as the most difficult level is one and the easiest is five. Level one should be used only by those who want to wear out their laser fingers and the keyboard at the same time. Tempest costs £3.95.

One of the cassettes in the range is for the 1K ZX-81. It contains three games, **Impact, Target** and **Death Ray.**

Impact uses a full-screen display and, surprisingly, the game has a title page. The aim is to steer your spaceship through an asteroid storm. It may not be very original but for a 1K game, written in Basic, we must give credit where it is due.

The second game is Target. You have a limited period in which to hit as many targets as you can, using your gun. You have to align the gunsight over a target and the gun fires automatically, destroying the target.

The last game is Death Ray. It imitates space invaders but the aliens do not play fair. You can fire your gun only vertically but they can fire vertically and diagonally. The Games Pack for the 1K ZX-81 costs £3.95. We have not seen a city bomber game for the 16K ZX-81 for a long time, so when **Bomber** arrived to be reviewed we did not know whether to laugh or cry. The game is below the standards which we have expected from companies producing ZX-81 software.

The bomber aircraft in question moves across the screen from left to right. The player must drop bombs on the city below to clear a runway on which to land. If a finger is kept on the rocket button it is not difficult to level the skyscrapers which stand in the way. Bomber costs £3.95.

On Knight manoeuvres

IN KNIGHT'S QUEST, a graphics adventure for the 48K Spectrum, you can go boldly where no knight has gone before. The object is to find Merlin's lost treasure. On your way you will encounter scorpions and dragons, battle with elves and rescue a princess from the wicked Wizard of Trill.

The game has more than 120 locations and many are underground. A graphics representation of most of the locations is shown in one corner of the screen and the use of machine code to speed the game when transferring from one location to another is apparent. **Knight's Quest** is definitely a game for all who like dungeons and dragons adventures.

Phipps Associates, manufacturer of Knight's Quest, also has a 16K version of the **Nowotnik Puzzle** for the Spectrum. It is fully machine-coded and involves the player trying to out-think the computer in moving an 'L' shape round the playing board. The person, or machine, who cannot move the 'L' loses the game.

Both games are interesting. Knight's Quest is available for £5.95 and the Nowotnik Puzzle for £4.95. Both can be obtained from Phipps Associates, 99 East Street, Epsom, Surrey, KT17 1EA.

Meet Evil Orville the invincible ball

THE LATEST Spectrum releases from Quicksilva bear a striking resemblance to original arcade games. The new offering is **Astro Blasters** and looks like a cross between two arcade favourites, Phoenix and Avenger.

Your spaceship is at the bottom of the screen and a squadron of alien birds wing their way through space, dropping clusters of bombs on you. If you manage to survive two attack waves, your spacecraft will run into a meteor storm which is sure to destroy it. The game is very colourful but the illusion of travelling through space is spoiled because the stars seem to appear on the screen at random and there is no scrolling effect as you move through space.

The second game is **Frenzy** and it looks like the arcade game Berzerk. You are in a maze patrolled by evil robots, a wandering ball called Orville and a mine-layer.

The robots can be destroyed but your laser gun will fire only in the direction in which you last moved. That can be awkward at times but it adds to the fun.

You will not be able to kill Evil Orville, so if you meet him it is best to dodge out by one of the four exits in the maze. You must also be careful not to step on the mines.

Astro Blasters and Frenzy are both available for the 16K and 48K Spectrum at £4.95 each.

They can be obtained from Quicksilva Ltd, Palmerston Park House, 13 Palmerston Road, Southampton.

Over-complex baby grow

SOME SOFTWARE houses seem determined to dispense with paper and pencils. They are overwhelmed by the excitement of new technology and do not stop to think whether the jobs they are asking computers to do would be better done by a few simple calculations.

The latest company to offer something of the kind is Medidata with its **Cycle Planner** program for the 48K Spectrum. It analyses menstrual cycles, working-out the most recent cycle, the next period date, the maximum fertility date and what the company calls unsafe dates. Also when conception occurs it can predict the most likely date of birth.

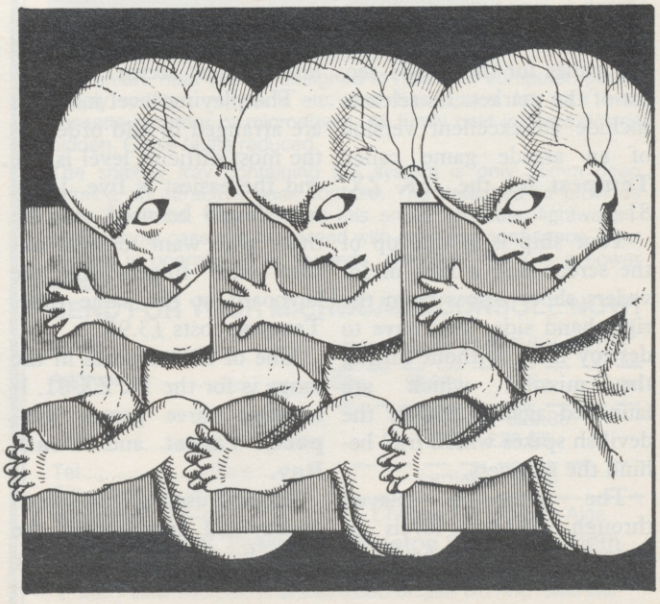
As the program has been designed to be used by beginners to computers, the chances of entering errors are small.

The information obtained is worthy and well-presented but could be determined with the same degree of accuracy in the time it takes to load the cassette. On the other side is **Growth Tracker,** a menu-driven database which estimates the growth of a baby before birth and for the first 24 months of its life.

It also shows the common illnesses which can affect young children, with their treatments.

The cassette costs £7.25 and Medidata says that its aims are as an aid to women and also to introduce more people to computer technology.

Both aims are commendable but there are cheaper and less complicated ways of doing them. Medidata is at PO Box 26, London NW9 9BW.



Musical education aid

ALL SPECTRUM owners now have the chance to name that tune or, in this case, name that musical note with the Software Cottage **Firework Music.**

The software is part game and part adventure into education. You have to guess the name of a musical note which is drawn on the screen using high-resolution graphics. You cannot take all day with your guess, because a spark descending into a box of fireworks sets the time limit.

If you make a correct guess you are awarded one firework in the box. If you run out of time the spark will reach the box and all those fireworks will go off with a bang. During the game you can have three boxes of fireworks and if you collect sufficient rockets you will be treated to a display which would equal any on November 5.

The game can be easy. All you have to remember is the EGBDF and FACE lessons which are usually taught to every schoolchild.

Firework Music is an ideal teaching aid for young children learning the rudiments of musical theory. It also uses a good psychological approach with a rewarding display at the end of the teaching session.

The game is available from Software Cottage, 19 Westfield Drive, Loughborough, Leics., LE11 3QJ. It costs £5.

Lacking imagination

DESPITE the glossy advertisements, Spectrum games from Imagine Software seem to be only average. The first program to be released is **Arcadia.** The player controls a spaceship at the bottom of the screen and waves of enemy fighter swoop in, dropping bombs. There is a series of levels to the game and on each level the spaceship Arcadia faces a different foe.

The colour and explosion effects in the game are unusual and the range of space invaders was interesting but the game lost its appeal after a few hours and became just another version of beat the evil nasties.

The second game also gave a good first impression but that wore off after play. The game centres on a black hole which sucks in all the garbage of the universe. The player controls an inter-galactic refuse collector.

The rubbish is displayed as three-dimensional cubes and pyramids and the collector must push it into the black hole. If the collector gets too near the black hole it will be sucked in.

Both games are for the 16K and 48K Spectrum and cost £5.50 each. They can be obtained from Imagine Software, Mason's Buildings, Exchange Street East, Liverpool, Merseyside, L2 3PN.

Playing its cards wrong

MICROMEGA, known for its selection of 1K ZX-81 games, has launched into the Spectrum market with a series of games which will work on both machines.

Monte Carlo is a cassette with two games on it. The first is **Blackjack,** in which you must try to break the bank — your computer opponent. The simulation has good graphics and the computer plays well but the reason for putting yet more card games on to a computer, especially one of Spectrum potential, is difficult to appreciate. To give the cassette a fair run for its money we moved to **Craps,** an American dice game in which you must throw a 7 or 11 on the first throw to win. If you throw a 2, 3, or 12 you lose.

The game is excellent and very difficult to beat but the same criticism can be made as for Blackjack. It would be better to have a pair of dice and throw them instead of waiting for the computer to load to program to do it.

The second Micromega Spectrum cassette is a little more taxing on the mind and demands more concentration. **Dominoes,** so far as we know, is the first simulation of the game to be put on to a computer.

The simulation is good and so are the graphics but, unfortunately, the same can be said as about the first cassette. It is difficult to understand why traditional card and dice games are put on to a computer time and again. There are already hundreds of versions of Blackjack, Pontoon, Twenty-one, and Craps available for Sinclair machines.

New concept in empty space

THE MANUFACTURER of **Black Hole,** for the 16K and 48K Spectrum, claims that the concept of this space game is completely new. So far as we can tell, the claim is not exaggerated.

The player must move around a black hole using positive and negative ion guns and a neutron blaster to destroy the hordes of aliens which spin and slide down the screen with terrifying speed.

The explosion effects are some of the best we have seen and the effects of the weapons are very interesting. When the player fires the neutron gun the ray emits curves, destroying everything in its path. That deadly advantage is soon equalled by the invaders, who storm down the screen destroying everything but the black hole which glows with odd colours.

The game has a learning mode in which you can practise your destructive talents. That mode contains no score and your spaceship will not be destroyed as in the play mode.

As a first effort in the Spectrum market, Quest Software has produced an entertaining and original space game. Black Hole costs £5.50.

The Galaxy's FIRST ever computer comic!

Zooming into touchdown at WH Smiths, John Menzies and other good newsagents on **JUNE 23rd** *and every fortnight... only 40p.* **Order your copy NOW!**

Bursting with great new comic strips... exciting stories... astounding facts.... big prizes... competitions... fascinating quizzes... star personalities. And that's just the start of Britain's newest, brightest, most fun-packed comic ever!

LOAD RUNNER

It's the only comic for the age of the computer – it puts the rest back with the dinosaurs!

JUNE 23rd

and every fortnight... order your copy NOW.

MEMOTECH

The Complete Range

NEW PRICES
UP TO 37.5% OFF
PLUS FREE P + P!

Fifteen months ago Memotech developed the first 64K Memopak, designed to maximise the capabilities of the Sinclair ZX81. Since then, using the ZX81 as a starting point, we've gone on to produce a comprehensive range of Memopaks, adding 16K and 32K memory expansions, utilities packages comprising a Word Processor, Z80 Assembler and Spreadsheet Analysis, plus Communication Interfaces, High Resolution Graphics and a professional quality Keyboard.

To complete our range of ZX81 add-ons, we are now introducing the MEMOPAK RS232 Serial Interface.

RS232 Interface

The RS232 is an all-purpose interface which allows the ZX81 not only to output to suitable serial printers, but can link up with numerous types of peripheral or even other processors. The Interface has two main modes of operation: BASIC mode allows you to use the range of functions supplied in the RS232 EPROM within an ordinary BASIC program, and TERMINAL mode allows you to use your ZX81 as a terminal to another processor. The EPROM functions offered permit the user to send, receive and convert bytes between ZX81 code and ASCII, as well as check the status of numerous control flags. Received or transmitted data can appear simultaneously on the screen, and received data may be printed simultaneously.

£39.95 inc. VAT

Memopak Centronics I/F

The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case. Additional facilities allow high resolution printing.

£24.95 inc. VAT

Memopak HRG

This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels.

£29.95 inc. VAT

Memocalc

The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a Memopak 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified.

£29.90 inc. VAT

Memotext

Text is first arranged in 32 character lines for the screen with comprehensive editing facilities. On output the user simply chooses the line length required for printing and the system does the rest. Used with the Memopak Centronics Interface, the Word Processor makes available printout with 80 character lines, upper and lower case and single and double size characters.

£29.90 inc. VAT

Memopak Memory Extensions

For those just setting out on the road to real computing, these packs transform the ZX81 from a toy to a powerful computer. Data storage, extended programming and complex displays all become feasible. Further details available on request.

16K Memopak £24.95 32K Memopak £34.95
64K Memopak £49.95 Prices inclusive of VAT

MEMOPAKS ARE AVAILABLE AT MAIN BRANCHES OF WH SMITH and JOHN MENZIES

Z80 Assembler

The Assembler allows you first to code and edit a source program in the Z80 language, and then assemble it into machine code. You can now write flexible and economic programs. The Editor mode allows you to code directly in the right format, manipulate individual lines and control the exact placing of source and machine code. Routines may be merged or listed (even to a commercial printer using our Centronics Interface). The assembler mode handles all standard Z80 mnemonics, numbers in hex or decimal, comments and user-selected labels.

£29.90 inc. VAT

Memotech Keyboard

The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.

Keyboard Buffer Pak

The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port of your ZX81.

£34.95 inc. VAT

All Prices are inclusive of VAT, postage and packing.

To Order: Send your Name, Address, Memopaks required, plus a Cheque/Postal Order/Access/Barclaycard number (please state which) to: Memotech Limited, Station Lane Industrial Estate, Witney, Oxon. OX8 6BX. Telephone Witney 2977

We want you to be completely satisfied with your Memopak – all our products carry a 14 day money back guarantee.

New from ...

MIKRO-GEN

SPECTRUM Software

COSMIC RAIDERS (16K) £5,95

You — the only remaining pilot of the "Earth Defence Fleet" — have the daunting task of defending the Earth from attack by alien beings that have already set up a base of their own on earth.

*** Radar Scanner display in hi-res ***
*** Full colour and sound effects ***
*** From the author of Spectrum 'Scramble' ***
*** 100% machine code ***

SPACE ZOMBIES (16K) £5,95

Shooting through space you are ambushed by a fleet of Space Zombies flying at you in formation, swooping and diving at you. Destroy them, if you can! But in destroying them, you attract more to the area, and the game gets progressively harder.

*** Full screen hi-res graphics ***
*** 1 or 2 players * Joystick option ***
***Full sound and colour ***
***Three playing speeds ***

MINES OF SATURN and RETURN TO EARTH £5,95

(16K) Text Adventure

Mines of Saturn While piloting a routine orbit of Saturn, you are caught up in a radiation storm which forces you into the giant planet's rings. Your energy drained, you make a forced landing on the planet's surface. Luckily you crashed near an abandoned mining base and you set off in search of some di-lithium crystals to refuel your stranded space ship. Can you do it?

Return to Earth Having escaped from your previous dilemmas, you reach Earth Station 1, but fail to make radio contact. You effect a safe if harrowing manual docking. On entry you find it deserted, and the control room destroyed. You must explore the station and find some way to alert Earth of your predicament, but beware, many of the rooms are identical, there is extensive damage, and signs of alien intruders.

Graphic Adventure (48K)

MAD MARTHA £6,95

Poor little Henry is the hen-pecked hero of this domestic tale. One night he can take no more. He steals his wages from his wife's purse, sneaks out of the house being careful not to wake the baby or trip over the cat, and heads for the bright lights to have some fun. Trouble is he runs out of money. His only way to raise some cash is to gamble his few remaining pounds on the spinning wheel of the roulette table. Just as Henry is getting into his evening his wife — Mad Martha — has noticed his absence. Realising Henry has absconded with the housekeeping she sets out after him with an axe. Guess what part you play in this happy tale? That's right, you're Henry. Watch out for that axe!

Access or Visa Card holders please telephone (0344) 27317 (9am-6pm)

Please add 40p per order for post & packing

Name _____ Address _____

☐	Cosmic Raiders	☐	Space Zombies
☐	Mines of Saturn/Return to Earth	☐	Mad Martha

MIKROGEN, Dept SP, 24 Agar Crescent, Bracknell, Berkshire, RG12 2BK

J.K. GREYE ENTERPRISES LTD

... is a new company, from J.K. Greye, set up specifically to bring you High Quality/Low Cost games for your Sinclair ZX Computers.

THE ARCADIAN

4 Games plus Menu
for the 16/48k SINCLAIR ZX SPECTRUM
only **£4.95** incl.
Includes
Invasion · Kamikaze
Minefield · UFO

Games as sold elsewhere for £5+ each, why pay more for less, when you can get all four for the price of one!

The **ARCADIAN** includes games to suit all ages, from 5 to 105

INVASION: Our version of the Classic Arcade Game, surely one of the best around. Includes Full Colour High Res. Graphics, Sound and it's incredibly fast at the end.

KAMIKAZE: If you like Scramble, you'll love this. 16 levels (long ones at that), of tortuously twisting caverns, Missiles, Starmines (which move in between games, so it's never the same next time around), Bases, Fuel Dumps (watch you don't run out of fuel!), and two speeds (difficult and impossible). Definitely a game for those amongst you with a suicidal tendency, when playing games, because you can score even when you crash! (If you can make it past level 8, write and let us know, 'cause that's as far as we've managed!).

MINEFIELD: A totally new game, in which you have to lay mines in a forest. Sounds simple doesn't it? But, once you start, you can't stop and there lies the rub (or to be more exact the explosion!). Guaranteed to get your fingers in a twist!

UFO: Dodge the Asteroids, blast the Alien Craft and work off your aggressive instincts on the keyboard. Gets progressively more difficult the longer you last!

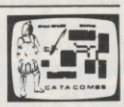
All of these for only £4.95, can you afford to miss out on this one!

ZX81 GAMESTAPES as previously sold by J.K.Greye Software ltd.

GAMESTAPE 1 for 1K _____ **only £3.95**
10 Games incl. ASTEROIDS, UFO, CODE, BOMBER, GUILLOTINE, KALIEDESCOPE, etc.
PROBABLY THE BEST VALUE 1k TAPE AVAILABLE.
We've done in 1k, games which some of our competitors require 16k to do!

GAMESTAPE 2 for 16K _____ **only £3.95**
★**STARFIGHTER** Superb machine code Space Battle, Set against a background of twinkling stars, with stunning explosions — if you can hit the enemy!
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse! A thinkers game.
ARTIST The ultimate Graphic Designers aid. 8 Directions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.

GAMESTAPE 3 for 16K _____ **only £4.95**
★**CATACOMBS** A Multi-Level Graphics Adventure. Each level can contain up to 9 Rooms, 8 Passages, 7 Monsters, Food, Gold, Traps, Phantoms, an Exit (to the next level), and there's an infinite number of levels.
NOTE .....This is NOT one of the necessarily limited text Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused for hours".....COMPUTERS & VIDEO GAMES.



Send your order to: **J.K.GREYE ENTERPRISES LTD. 16 Park St. Bath BA1 2TE**

Please tick boxes of required tapes.

The ARCADIAN at £4.95 ☐
GAMESTAPE 1 at £3.95 ☐
GAMESTAPE 2 at £3.95 ☐
GAMESTAPE 3 at £4.95 ☐

All Software sold subject to the condition that Hiring, Lending, Unauthorised Copying or Resale is Strictly Prohibited

Name .....
Address .....
..... Postcode .....
I enclose a cheque/P.O. for £.....
made payable to **J.K. GREYE ENTERPRISES LTD.**

TRADE & EXPORT ENQUIRIES WELCOME

PROGRAMMERS! Do you think you can write brilliant games Software for the spectrum? If so, contact us and we'll market it for you. if you don't think your games are the best around, try the other Software Houses, because we will only sell the best!

If you prefer to see before buying, our range of Gamestapes are stocked by W.H.Smith, John Menzies and good computer stores Nationwide

Plenty for experts and beginners

Brian Stokes looks beyond the first impressions of the Welsh machine

ON FIRST impressions, somebody wishing to buy a computer may think that the Dragon is nothing but an upgraded ZX-81.

The bland green and black screen display which appears on power-up shows none of the real power of the machine. The full-size typewriter-style keyboard may appeal to buyers but it is not until the programmer has worked with the machine for some time that its true potential is realised.

The computer uses Microsoft Basic which, in many ways, is superior to Spectrum Sinclair Basic. Some of the commands, however, such as IF ... THEN, are extended to make the language more powerful.

The Dragon has two sockets for joysticks and a Centronics interface for a printer, all of which are controlled using Basic commands. The machine uses an ordinary cassette recorder which should have a remote socket. The recorder motor can then be controlled by the computer, also using Basic instructions.

Unfortunately the sound levels of the cassette recorder need to be set very precisely or tape errors will begin to occur. The machine we reviewed would normally take only new, clean cassette tapes but once the correct recording level was determined, cassette operation caused no more difficulties.

It may seem strange that word processing can only be done using the Dragon, as the machine displays upper-case on the screen; but lower-case mode is available to a printer. When in that mode the Dragon will display all characters in inverse video, with green lettering on a black background.

The computer also has print formatting commands built into its version of Basic. They enable the programmer to specify how numbers and strings are displayed and can be used to create neatly-tabulated lists of figures. The formatting commands are exceptional on a computer which costs less than £200.

The Dragon can produce only one sound at a time from the loudspeaker of a television set. Tunes can be programmed by using a string of letters, from A to F, in quotation marks, after the PLAY instruction. When the program line is executed each note within that string is played in turn.

> 'It is assured of a growing slice of the market'

That is a good solution to the problem of producing tunes easily. It means that a fairly lengthy tune can be played by using only one line of program instead of many BEEP commands or long data lists on the Spectrum.

When LOADing and SAVEing on cassette with the Dragon the computer provides an AUDIO ON and AUDIO OFF set of commands to allow the user to hear the tones being produced during the procedures. Those commands are useful for monitoring the quality of a tape or ensuring that no errors occur during SAVEing on to cassette.

Although the standard Dragon has no user-definable graphics capability, one of the most outstanding things about the machine is its graphics abilities. The computer has a set of low-resolution block characters, similar to those on the ZX-81 and Spectrum, which can be accessed using the CHRS command and the code number of the graphics character which is needed.

High-resolution graphics screens are called pages and special video RAM can be reserved within the machine for a certain number of them. Usually there are four pages which can be flipped through under program control to create an animation effect on the screen.

Each frame is put on a separate page and a page can be brought to the screen at any time using a simple Basic command and what is essentially an index number. The execution of the graphics commands is extremely fast, so good arcade-type graphics effects can be achieved without having to resort to machine code.

There are five resolution grids available on the Dragon screen. They range from a density of 128 × 96 pixels to 256×192 pixels. The highest resolution will allow only two colours at the same time. They can be a combination of black and green or black and buff.

It is possible to draw lines and circles on the screen. The co-ordinates used in the line-drawing commands do not have to be offsets of the last line drawn, as on the Spectrum, but the LINE command on the Dragon is just as complicated to use. It is also possible to draw in the same way as on the Spectrum, except that you specify two extra points in the CIRCLE command and the colour in which you want to draw the circle.

The Dragon certainly offers plenty to both the beginner and the expert programmer. The machine has been maligned in the past but has gained steadily in popularity since before Christmas. What deters most people is the price, which could be reduced to make it more competitive, and the fact that on first impressions the machine does not have exceptional appeal.

While the Dragon is not in the same price bracket as the Spectrum, it is a competitor for public favour in the microcomputer market. More back-up is beginning to filter through for the machine, especially from overseas, and the Dragon is assured of a steadily-growing slice of the market in the foreseeable future.

ATTENTION ALL CO

YOU KNOW THAT: **QUICKSILVA** S

YOU KNOW THAT: **QUICKSILVA** N
3
N
A

YOU ALSO KNOW THAT: **QUICKSILVA** G
C
S
C
A
A

BUT!

DID YOU KNOW THAT: **QUICKSILVA** I

RING 01-572-1911 AND ASK ABOUT THEIR SPECIAL Q.S. 48 HOUR DELIVERY!

ZAP!

P.O. BO
HOUNS
TW3 3P
01-572-

COMPUTER SHOPS!

A SOFTWARE SELLS ITSELF!!!

A NOW HAS A HUGE RANGE OF 37 TOP-SELLING PROGRAMS, FOR THE ZX-SPECTRUM, VIC-20, BBC, DRAGON-32 ATARI-400/800 & ZX-81.

A GIVES ITS DEALERS CONSTANT, COLOURFUL ADVERTISING SALES SUPPORT IN A WIDE RANGE OF POPULAR COMPUTER MAGAZINES [AND, CAN ACTUALLY SUPPLY THE PROGRAMS ADVERTISED!]

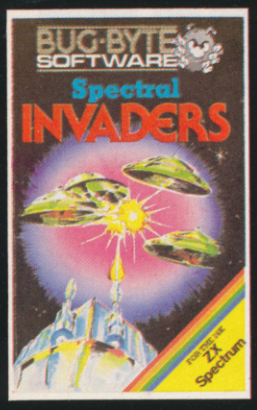
A IS NOW DISTRIBUTED IN THE U.K. BY

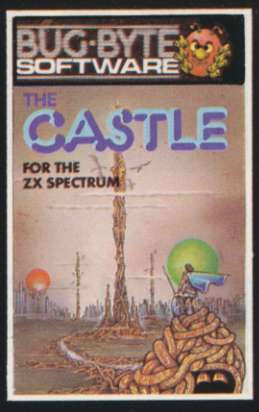
U.K.

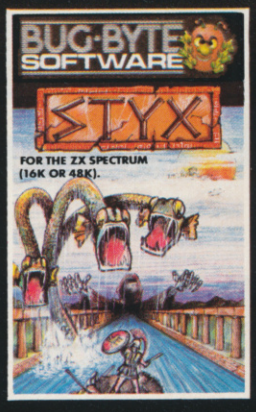
BOX 14
NSLOW
3PL
72-1911

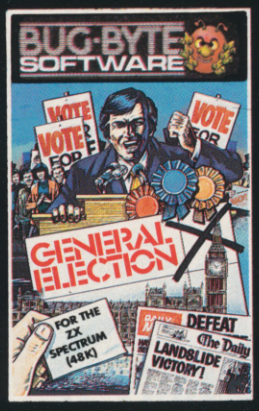
RING 01-572-1911 AND ASK ABOUT THEIR ATTRACTIVE DISCOUNTS

RING 01-572-1911 AND ASK ABOUT THEIR SPECIAL EMERGENCY DEALER SUPPLY LINE









SEVEN UP!

BUG-BYTE SOFTWARE™

Mulberry House, Canning Place, Liverpool L1 8JB

Selected titles available from larger branches of Boots and W.H.Smith, Spectrum, Laskys, Currys Micro-C and all good Computer Shops. Also by mail order from Software Express.

Writing programs is time-consuming. John Gilbert examines a collection of cassettes which help to make the job much simpler

The easier route from Basic to machine code

THE BEST WAY to learn about machine code is to use an assembler. Machine code consists of numbers but with an assembler the user can write code in assembler language, which looks more like Basic and is easier to understand. The program will then convert the user's assembly language instructions, called source code, into machine code.

Although the ZX-81 has been around for several years there are only a few machine code assemblers available on the market for it. The only big companies to produce assemblers for the machine are Artic Computing and Bug Byte. Both built their reputations with these assemblers.

The Artic assembler is a two-pass program. It will permit full use of labels, will inspect and modify registers and also allows output to a printer. The code to be assembled is put into a REM statement at the beginning of the program and all code can be written in standard Z-80 mnemonics. The assembler will also assemble messages which are to be used in programs into hexadecimal code. It costs £9.95.

The other best-seller is the Bug-Byte ZXAS. The program is similar to that of Artic but was launched in a blaze of publicity as being the first machine code assembler for the ZX-81.

Bug-Byte also wanted to be the company which produced the first assembler for the Spectrum but it was to be disappointed. Wrangling within the company between its programmers put the release date further and further back until the package became available early this year.

The program is for the 16K and 48K Spectrum. It is very comprehensive in its options and very easy to use. As well as assembling user machine code, it has a full editor facility with which the user

continued on page 38

continued from page 37

can view assembly code, delete and insert, search for specific strings of text within machine code, and list all the labels which have been specified by a user in a program within a cross-referenced table.

The editor will also reverse 16-bit values, such as memory addresses, if the user specifies that option. That facility is useful when dealing with a large number of 16-bit addresses in a long program. The use of 16-bit values can be a problem for beginners, who often do not know whether or not to reverse a number.

The program also has a good cassette interface. Both the source code — the user's — and the object code — assembled-code can be filed on to cassette. That means that source code can be saved and re-edited when the user needs it. The saved source code could also be useful if the programmer wanted to upgrade a program.

Unfortunately the manual, or lack of it, provides points against Aspect. Instructions are written on a piece of paper. They are just about adequate and contain no examples. Aspect costs £9 and is available from shops such as W H Smith.

Picturesque slipped its Editor/Assembler on to the market very quietly. The program is for the 16K and 48K Spectrum and is very powerful. It is complete with a comprehensive user manual which a complete beginner can understand.

The Editor is the part of the program which enters the source code. It is possible to enter code in the same type of format as a Basic program, as each line is given a line number. Unlike the Basic system on the Spectrum, line numbers can be generated by the program automatically with the use of the AUTO command. The use of line numbers means that the source file can be edited quickly and easily.

When the source code has been entered correctly and there are no bugs in the text, the assembler can be called into operation. The usual ORG instruction is included as part of the instruction set to define the address at which the assembled code should be put.

The program display is interesting, as the screen has a 40-column width and is split into several fields which correspond to those used in assembly language programming, together with a line number field. The cursor recognises the end of one field and jumps to the next automatically. That makes the entered source code easy to understand.

The Editor/Assembler is ideal for the beginner and could also be a powerful tool in the hands of a professional programmer. It costs £8.50.

The program which has caused a buzz of excitement in the *Sinclair User* offices is probably one of the most powerful assemblers which we have reviewed. It is all the more remarkable as it is produced by a small and, until now, largely unrecognised software house, Crystal Computing.

The program, Zeus, is a two-pass assembler which allows the use of the full Z-80 mnemonic instruction set. Source code can be line-numbered and an AUTO line-number facility is also available.

The program is accompanied by the best manual we have seen for an assembler. It contains step-by-step instructions for entering and editing source code. An example is included which will, if entered correctly, colour the screen white, the current ink colour.

The use of an example in that way is good, because if you make a mistake and the program does not work you will have to re-learn the instructions. If the example works, users will have a good understanding of how Zeus operates.

Zeus also contains several subroutines which can be used within source code. They include an INKEY$-type function and print a character routine. Other functions in the assembler include automatic re-numbering of the source file, outputting of code to a printer, and the reclaiming of 'old' source files for further work. Zeus has been aptly-named by Crystal Computing. It costs £8.95.

There are very few good assemblers on the market although the big software houses all claim to have the best available. It is, therefore, surprising that a small company like Crystal should produce such an excellent assembler as Zeus. The reason may be that while large companies spend their money on colourful advertising, smaller companies need to rely on very good quality products.

'One of the most powerful assemblers which we have reviewed is produced by a small, and largely unrecognised software house, Crystal Computing'.

Artic Computing, 396 James Reckitt Avenue, Hull, North Humberside HU8 0JA.
Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB.
Crystal Computing, 2 Aston Way, East Herrington, Sunderland SR3 3RX.

QUEST

FOR ANY SPECTRUM

SIMPLY THE BEST

THE BLACK HOLE

THE SCENE: Alien spacecraft are using hyperspace drive to enter our universe through a black hole. Their intent is destruction.
YOUR MISSION: To uphold the defence of your universe as long as possible while inflicting the maximum damage on alien forces.
YOUR WEAPONS: Positive and Negative Ion Guns are deadly at any range but the ion stream is bent by the massive gravitational field of the black hole. The Neutron Blaster is equally deadly but has only limited range.
YOUR BATTLE: You are under constant attack from the alien force which pits fiendish offence craft against you in ever increasing intensity, in deadlier and deadlier form.
How long can your fleet of ships survive? How many enemy craft can you destroy?
100% super efficient machine code allows all this action to be packed in to run on the 16K (or 48K) Spectrum. Superb animation, high resolution graphics, incredible explosive and full sound effects combine to make "Black Hole" set a new standard in Spectrum software.
Also features a special learning mode to help develop your skills.
Embedded in the software is our unique score validifier which enables us to introduce a new dimension to computer games. The top ten scorers in each calendar month from April through September will receive a "I'm a Black Hole addict" T-shirt and the chance to compete for prizes to the value of £500 in a championship to be held at the end of the year. We will then publish a list of the top 1000 scorers so you can find out just how good you are.

HOW GOOD ARE YOU? Take up the "BLACK HOLE" challenge NOW and find out. Send £5.50 to QUEST, 119 THE PROMENADE, CHELTENHAM, GLOS GL50 1NW to receive your copy of "BLACK HOLE" by return first class post together with a membership number entitling you to discount on our forthcoming blockbusting software.

Trade enquiries welcome excellent terms available

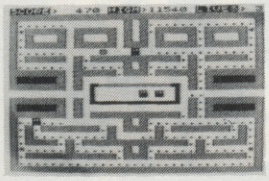
A NEW DIMENSION IN SPECTRUM SOFTWARE

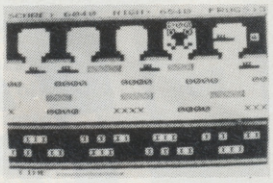
DJL SOFTWARE

DEPT SP, 9 TWEED CLOSE, SWINDON, WILTS SN2 3PU

Tel: (0793) 724317 Trade enquiries welcome

Export Orders: Please add £1.00 per tape airmail





ZUCKMAN
ZX81 (16K)

*ALL MACHINE CODE (10K)
*FOUR INDEPENDENT GHOSTS
* HIGH-SCORE 'HALL OF FAME'
*AUTHENTIC ARCADE ACTION
*TITLE/DISPLAY MODE

ONLY £5.95 INC. P&P

FROGGY
ZX81 (16K)

*MOVING CARS, LOGS, TURTLES
*ALLIGATORS, DIVING TURTLES
*FOUR 'SCREENS' OF ACTION
*ALL ARCADE FEATURES
*ENTIRELY MACHINE CODE

ONLY £5.95 INC. P&P

NEW **ZX Spectrum** NEW

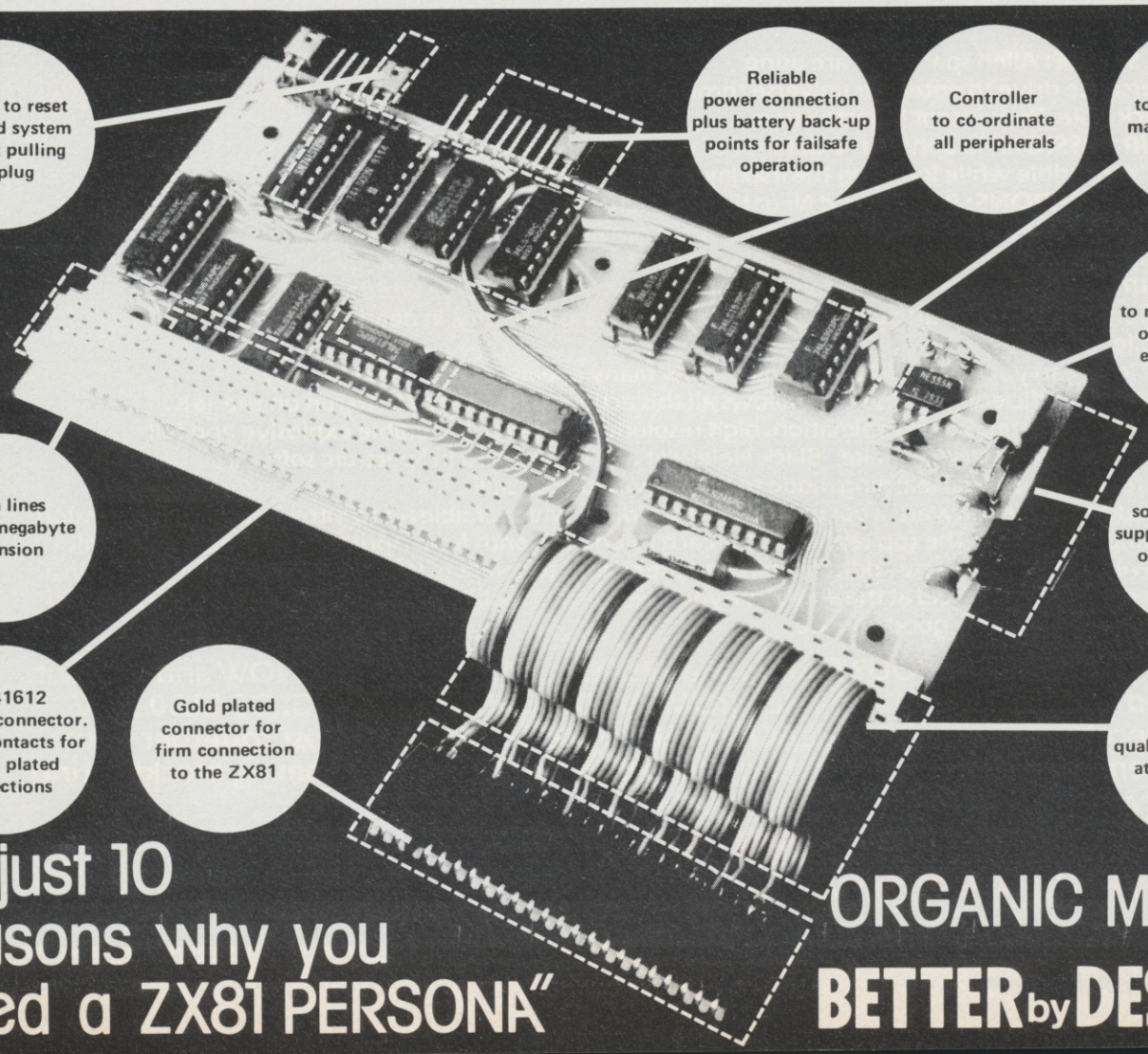
FROGGY 16K or 48K

SPECTRUM VERSION OF ARCADE GAME WITH FULL ARCADE FEATURES:

- ★ Fabulous Hi-Res Colour Graphics
- ★ Authentic Sound Effects + 3 Tunes
- ★ 3-D Logs, Swimming & Diving Turtles
- ★ 3 Lanes of Multi-coloured vehicles
- ★ On-screen Score, Hi-Score, Time-bar
- ★ Snake, Alligators and Baby Frog
- ★ 'Top 5' High-Score initials table
- ★ Demonstration Game routine

Your home-sick frog must leap across a busy main road, then onto logs and turtles in the river to reach safety of the river-bank frog-homes. THIS MACHINE-CODE GAME MUST BE SEEN TO BE BELEIVED!!

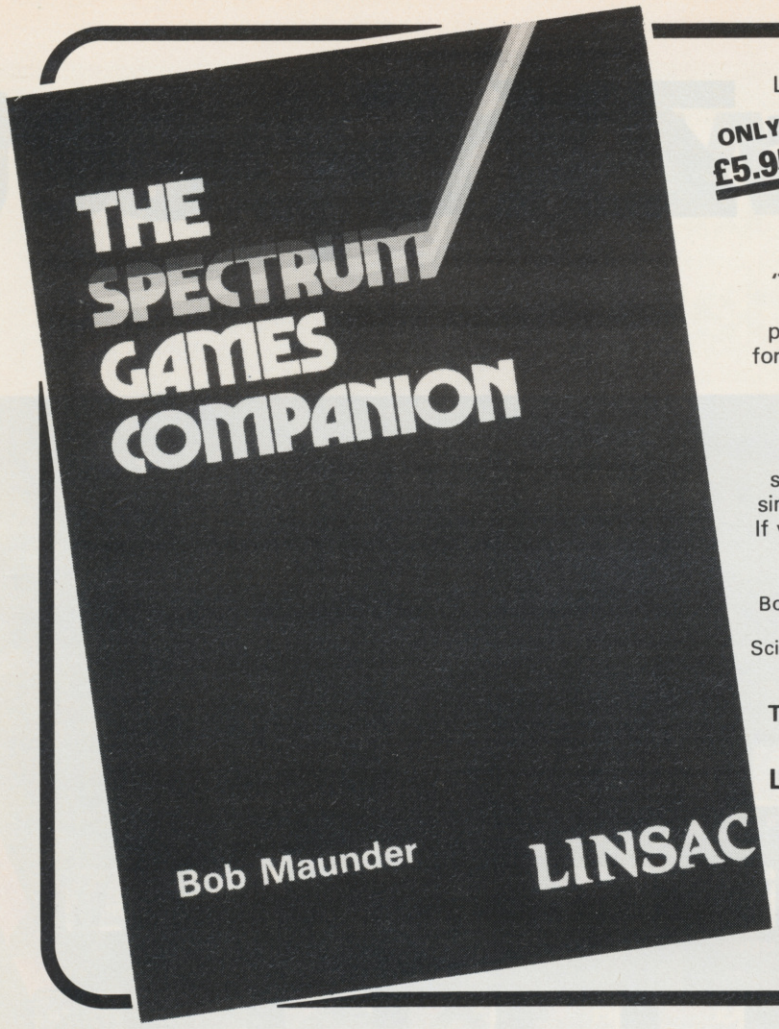
ONLY £5.95 INC. P & P


Facility to reset a crashed system without pulling the plug
Reliable power connection plus battery back-up points for failsafe operation
Controller to co-ordinate all peripherals
Circuitry to supervise and maintain memory add-ons
Power drivers to minimise loading on ZX81. More expansion with no troubles
Extra lines for one megabyte expansion
Extra sources of power supplies to eliminate overheating on the ZX81
Din 41612 standard connector. Perfect contacts for 64 gold plated connections
Gold plated connector for firm connection to the ZX81
4" of high quality ribbon cable at no extra cost

"....just 10 reasons why you need a ZX81 PERSONA"

ORGANIC MICRO

BETTER by DESIGN



Linsac's ZX Companion series has received excellent press reviews:

ONLY £5.95

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!

Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

LINSAC, (SU) 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

ISBN 0 907211 02 X

PERSONA ZX

YOUR KEY TO THE TOWER OF POWER

You simply choose the following modules you want and plug them into the PERSONA and turn your ZX81 or ZX SPECTRUM into a total computing package ... into an ORGANIC MICRO.

PERSONA ZX81	£30.35
PERSONA ZX SPECTRUM	£45.00
RAM 08 (2K)	£24.50
RAM 16	£26.75
RAM 64	£76.25
MINIMAP	£35.95
DROM (2K)	£39.50
TOOLKIT	£22.20
PERICON a	£27.90
PERICON b	£33.75
PERICON c	£41.75
SONUS	£30.15

Options: USERFRONT	£8.00
Additional 2K for RAM 08	£6.50
Additional 2K for DROM	£7.50

Prices include VAT, Postage and Packing for U.K. deliveries. Overseas Orders: please add 15% to price for surface mail.

Post to: BASICare MICROSYSTEM LTD.
12 Rickett Street, London SW6 1RU.
Tel: 01 - 385 2135

BASICARE MICRO SYSTEM

Sinclair ZX Spectr

The growing range of Spectrum Software

You'll know already that the Spectrum has generated an enormous range of peripherals and independent software. Our own range is growing very fast and is shown in the Sinclair Software Catalogue – *free* with every ZX Spectrum.

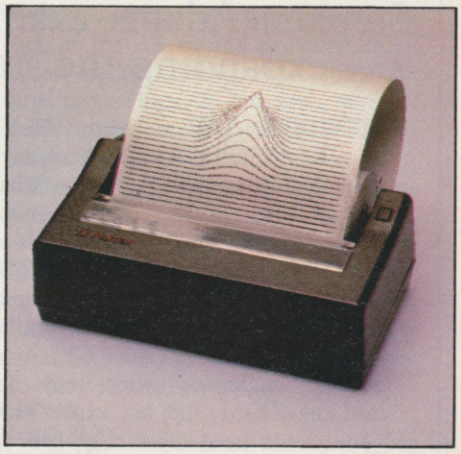
trum-news!

16K now £99·95

Previously £125.

48K now £129·95

Previously £175.



ZX Printer now £39.95

Previously £59.95

How to order your ZX Spectrum
Access, Barclaycard or Trustcard holders – call 01-200 0200 24 hours a day, every day. By FREEPOST – use the coupon below. Please allow up to 28 days for delivery. 14-day money-back option.

sinclair
ZX Spectrum

Sinclair Research Ltd., Stanhope Road, Camberley, Surrey, GU15 3PS.
Tel: 0276 685311. Reg. no: 1135105.

At last, a 16K colour computer with graphics for under £100!

Why have we done it?

Partly because the sheer volume of Spectrums sold (over 300,000 so far) has brought down unit production costs.

And partly, of course, because we hope you'll buy a Sinclair computer – and not some competitor's promise! We've all heard about colour computers breaking the £100 barrier. Here's the computer that's done it. A colour computer with advanced graphics that's fully supported, and widely available.

Right now, you can order a Sinclair Spectrum at these prices direct from Sinclair on the order form below. And to make it even easier to handle high-level computing at the lowest possible price, we've cut the cost of the printer, too. At £39.95, it's almost unbelievable!

At prices like these, there's really no reason to wait.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	3000	99.95	
	Sinclair ZX Spectrum – 48K RAM version	3002	129.95	
	Sinclair ZX Printer	1014	39.95	
	Printer paper (pack of 5 rolls)	1008	11.95	
	Postage and packing: orders under £90	0028	2.95	
	orders over £90	0029	4.95	

Total £ _____

Please tick if you require a VAT receipt

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ _____

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable.

Signature PLEASE PRINT

Name: Mr/Mrs/Miss

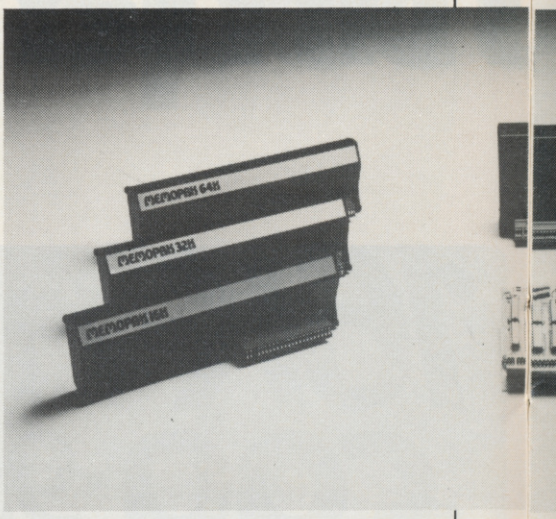
Address

SUS907

FREEPOST – no stamp needed. **Prices apply to UK only.** **Export prices on application.**

Cheap is not nasty in memory packs

Stephen Adams examines the many ways of expanding the storage of the ZX-81.



THERE ARE so many ZX-81 RAM packs around these days that it is worth looking at what they can offer in the way of more facilities.

First, a little explanation of the ZX-81 memory map and ROM routines would help in understanding the limitations of the ZX-81.

Sinclair engineers, when they designed the ZX-81, did not expect that anyone would need more than 16K of RAM. So they took some short cuts in the design which made it cheaper and easier to access the RAM and ROM. One of the them was to restrict the upper 32K of the memory map to working the screen and nothing else. The other was that the ROM, which is only 8K long, was allowed to repeat itself throughout the memory map unless the RAM was working in that area.

Those decisions allowed them to decode only the top two ADDRESS lines—A14/A15—to determine whether RAM/ROM or RAM with DISPLAY was on at any one time, the address line A15 deciding whether the display was on or not and the display being on only in the top 32K of memory and thus dividing the memory map in half.

The A14 address line divided each 32K section into two quarters, the bottom half of which was ROM and the top half RAM. As they were the only decoding done inside the ZX-81 the 1K of RAM repeated itself all the way through the 16K RAM section.

Memory map of the ZX-81

64K	
48K	**RAM for display—display file**
32K	**ROM appears again**
32K	**1K or 16K RAM**
16K	**1K or 16K RAM**
8K	**ROM appears again**
0K	**True ROM area**

When the 16K RAM pack is added, however, it is switched-off by the use of the RAMCS line on the edge connector and the RAM chips in the RAM pack do all the extra decoding necessary to divide the 16K section into individual bytes.

To expand the memory above 16K required some special decoding in the RAM pack so that it did not interfere with the display, which needs a repeat of the first 16K of RAM at 48K and above in the memory map.

It also required that the ROM be restricted to the first 8K of the memory map. That was done by using the ROMCS line in the same way as the RAMCS was used on the 16K RAM pack. Memotech was the first company to produce a 56K RAM pack. Most of them are now called 64K packs but you can use only 56K and that allows you to use 48K for Basic and 8K RAM where the ROM used to be, between 8K and 16K, for machine code.

There are some restrictions on using the 48K as you cannot run machine code in it and you have to be careful that the display file does not cross the 32K border. Memotech now has 16K and 32K RAM packs in the same boxes as its 64K ones, which are often used by dealers as a second choice to the Sinclair 16K RAM. Memotech has a good reputation for service. The 32K pack allows you to use your 16K RAM pack as well to achieve 48K.

The boxes are made from extruded aluminium and are used as a heatsink for the internal +5V regulator. RAM wobble problems should be familiar to all readers and Memotech is no exception but the company provides a Velcro strip which binds the packs to the ZX-81 and other packs. The instructions are clear and concise in a booklet accompanying each pack but they are expensive.

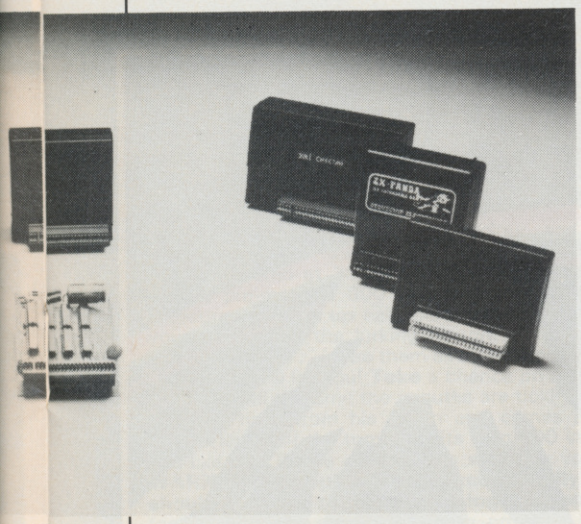
The Sinclair 16K RAM pack has received both complaints and praise. The complaints are from users who have had to experience RAM pack wobble, which occurs when using the Sinclair keyboard. The design of the RAM pack is such that it is not connected firmly to the ZX-81 and the top of the RAM pack rests against the top of the ZX-81 case. Every time the keyboard is used that lifts the RAM pack from the table and shakes it. The edge connector eventually becomes so loose that any slight movement will disconnect it from the ZX-81, corrupting the ZX-81 memory.

Several methods have been produced to stop the wobble — flexible cables so that the RAM pack can be laid flat on the table from dK'tronics and the RAM-LOK from Adapt Electronics which bolts together the ZX-81 and RAM.

The best method, though, is to buy a RAM pack which has been designed to eliminate the wobble. They consist mostly of not allowing the circuit board to be connected to the casing of the RAM pack, so that the board can move up and down inside the case with the movement of the ZX-81. A reliable stiff edge connector is also required. Some, like that from Cheetah, have also been designed to wrap round the back of the ZX-81 so that there is little movement between the two casings. Some manufacturers are also using +5V-only RAMs so that they do not have to provide a power supply from the +9V supply which can vary depending on the equipment used.

Kayde, Camel and Econotech 16K RAMs are good examples of the first type, the first two being cased. The ZX-Panda and the Cheetah are good examples of the second type.

The ZX-Panda can also be used to give 32K by adding a small PCB containing 16K more RAM inside the case. The special Audio Computers RAM pack is in the category where the design has not been so successful. The RAM



pack was specially-shaped to conform with the back of the ZX-81 but it still requires sticky pads and a special plastic insert to prompt it to work. Some of the RAM packs provide a LED — a little red light — but that only provides an indication that there is power to the RAM pack and not whether it is working correctly.

The best choice is obviously a non-wobble RAM pack which is inexpensive. If you can afford it and do not want to use pre-programmed ROMs or other devices, opt for a cheap 64K RAM pack. They take up just as much power as the 16K and will also work with the Sinclair printer — see the table for a list of facilities of the various RAM packs.

Basicare provides a different kind of RAM; you must first buy a base module to use its RAM, called a Persona. It is in 16K and 64K packs for the ZX-81 up to a maximum of 512K. That is divided into banks and you will require other modules to have the banks talk to each other. The maximum memory available at one time is 32K. It is the only system which allows you to run big programs but at the moment there is very little software to run it.

Yet another type of RAM pack is available and that is the battery-backed RAM — DROM, which allows the user to do things which normally would have to be run in from tape — instantly. They can provide storage for routines to side-scroll the screen in any direction, assemblers, new operating systems to replace the Sinclair ROM or even your own favourite Basic program.

A multitude of DROM packs is produced by Camel Products. Two of them work on the ZX-81, the Memic 81 and the Cramic. The Memic 81 contains one or two static 2K by one-byte chips giving 2K or 4K of RAM backed-up by a battery when the power is off to preserve its memory. That occupies any position in 8K-16K area of the memory map. DROM devices allow you to write a machine code or a Basic program and transfer it into the 8K-16K area of the memory map. Machine code can be run from there, saving valuable RAM space, but Basic programs must be uploaded to the Basic area before running the program.

That means that any Basic program is limited to 8K unless the Cramic is used which is 16K long. The routines for the transfers are included in the notes with every pack and consist of machine code routines which must be run by using the USR command.

The Cramic is a special case as the 16K can be switched in or out by a software switch and so a Basic program can be loaded from tape into the Cramic and sealed-off from the ZX-81. Powering-off the ZX-81 then has no effect, as the RAM module has its own battery to keep it operating. The program can be restored by powering-up the ZX-81 and running a machine code program to step back in the Cramic where you ceased. That leads to my first criticism of the notes; nowhere is it mentioned that you should save the machine code program on tape, in case something goes wrong.

The code required is very short but as it needs to be put into memory before using Cramic it would have been better to load it from tape. That routine could be stored in the Memic 81, of course, which is outside the Basic area and the routine loaded into the Basic area from there. The advantage of DROM over ROM is that it can be changed.

The other DROM is available only in kit from from Hunter Electronics and consists of board which plugs into the back of the ZX-81 and provides 2K of battery-backed RAM, with space for three more chips. If you wish, some of them can be turned into ROM sockets to take 2K or 4K EPROMs.

The RAM pack race has now become so cut-throat that a few firms which were doubtful have withdrawn. The firms remaining are giving the customers what they want, depending on price. Cheap is not necessarily nasty any more. So look for the bargains — they are there to be found.

DROMS

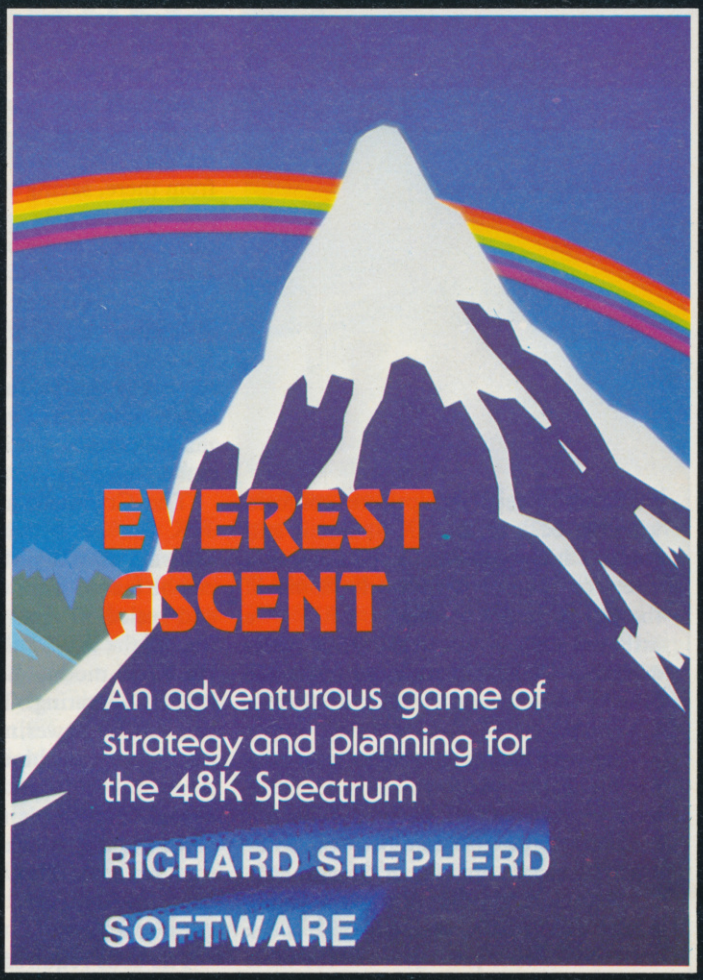
Memic 81 4K	**£34.45**
Cramic 16K	**£91.95**
Basicare 2K	**£39.50**
Hunter 2K	**£19.95**

SUPPLIERS

Basicare Microsystems Ltd, 12 Rickett Street, London SW6.
Cambridge Microelectronics (Camel), 1 Milton Road, Cambridge.
Cheetah Marketing Ltd, 359 The Strand, London WC2.
JRS (Econotech), 19 Wayside Avenue, Worthing, Sussex.
dk'tronics, Unit 2, Shire Hill Ind. Estate, Saffron Walden, Essex.
Kayde, The Conge, Great Yarmouth, Norfolk.

RAM pack	Anti-wobble	+5V only	Cased	Price
Basicare 16K	✓		✓	**£26.75**
Basicare 64K	✓		✓	**£76.25**
Camel 16K	✓	✓	✓	**£20.64**
Camel 64K	✓		✓	**£80.45**
Cheetah 16K	✓		✓	**£19.75**
Cheetah 64K	✓		✓	**£44.75**
Econotech 16K	✓			**£20.95**
dK'tronics 16K	✓		✓	**£22.95**
dK'tronics 64K	✓		✓	**£52.95**
Kayde 16K	✓	✓	✓	**£29.95**
Memotech 16K			✓	**£29.90**
Memotech 32K			✓	**£49.95**
Memotech 64K		✓	✓	**£79.00**
Sinclair 16K			✓	**£29.95**
ZX-Panda	✓	✓	✓	**£19.95**

NOW AVAILABLE FROM W. H. SMITH & SON AND JOHN MENZIES



TRANSYLVANIAN TOWER

A spine chilling adventure ... enter via the dungeons ... navigate your way through 500 3-D rooms ... survive the swooping vampire bats ... reach the terrifying top ... and rid the world of the evil Count Kreepie!

Can you survive the top of The Tower?

Full save routine for use during the hours of darkness!

48K Spectrum. **£6.50.**

Also available by mail order

SHIP OF THE LINE

Command, a sailing ship ... juggle your supplies, crew and firepower ... fearlessly battle your way up the admiralty ladder, bribe Sea Lords as necessary ... until you make First Sea Lord! Full save routine. 48K Spectrum. **£6.50.**

EVEREST ASCENT

Conquer the world's highest peak in defiance of all the obstacles, men and nature can throw at you ... survive avalanches ... cross bottomless crevasses ... cope with wayward Sherpas — but don't run out of supplies!

Full save routine. 48K Spectrum. **£6.50.**

Also available by mail order

SUPER SPY

A global spy chase through complex puzzles, coded messages and 3-D mazes. Follow Dr. Death's trail ... locate his secret island ... discover the entrance to his lair ... but it doesn't end there! A different solution every game. Full save routine. 48K Spectrum. **£6.50.**

RICHARD SHEPHERD SOFTWARE

Dealers Generous discounts available

Credit Card Hotline 0628 21107

All programs are sold subject to the condition that they may not, by way of trade or otherwise, be lent, hired out, resold or otherwise circulated without the written permission of Richard Shepherd

DISCOUNT: BUY TWO GET £1 OFF
BUY THREE GET £2 OFF
BUY FOUR GET £3 OFF

ALL PRICES INCLUDE VAT & FIRST CLASS UK POSTAGE
OVERSEAS ORDERS ADD £1.50 FOR AIR MAIL

48K EVEREST ASCENT	at £6.50	£
48K TRANSYLVANIAN TOWER	at £6.50	£
48K SUPER SPY	at £6.50	£
48K SHIP OF THE LINE	at £6.50	£
DEALER PACK	—	
	DISCOUNT	—
	TOTAL	£

a) I enclose cash/cheque/P.O. payable to Richard Shepherd Software
b) Debit my ACCESS/VISA Card No.

with the sum of £ ..... Signature .....

NAME ..... ADDRESS .....

.....

.....

SEND IMMEDIATELY TO: RICHARD SHEPHERD SOFTWARE
FREEPOST (no stamp needed), MAIDENHEAD, BERKS, SL6 5BY

THE TOMB OF DRACULA!

3D HORROR ADVENTURE GAME!

For the **16K ZX81** or with colour and sound for the **48K SPECTRUM,** a superb 3D graphics adventure game! **Enter** Dracula's tomb at 30 minutes to sunset . . . **wander** through the tomb's pre-mapped 300 vaults in search of the fabled Vampire's Treasure . . . **pick up** valuable silver stakes and use them to defend yourself against the lurking horrors . . . ghouls, zombies, pits of primaeval slime . . . **See** them all on the computer's plan of the tomb . . . when it will let you! **Take** a chance on a Mystery Vault . . . if you dare! And all the time the minutes are ticking by to sunset . . . when **Dracula** rises from his coffin and comes after **you!** Each of the infinite levels of the tomb has its own 300 vaults . . . go as deep as you like, the Prince of Darkness will seek you out in his blood-lust! **WARNING: people of an exceptionally nervous disposition should play this game only during the hours of daylight!** Special facility lets you save a game in progress onto tape so you can continue it whenever you choose.

For ZX81 with 16K RAM £3.95
For 48K SPECTRUM £4.95

Price includes ready-to-load cassette with library case and inlay, full instructions, postage and packing. **Order today!** Money refunded if not delighted!

Send cash, P.O. or cheque to:

FELIX SOFTWARE (DEPT. SU11)

19 Leighton Avenue, Pinner, HA5 3BW.

R & R

STAR TREK 48K

Rid the Galaxy of the evil Klingons, Protect your Star Bases from attack. *("Easy to play. Difficult to beat". Sinclair User Dec '82)*

ONLY £4.95

P-E-P

THE PROGRAM ENHANCEMENT PACKAGE FOR THE ZX81 (16K)

A suite of easy to use machine code routines designed to transform your Basic programs.

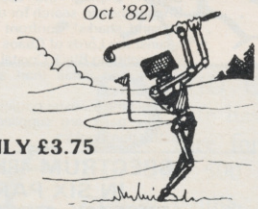
■ **DEFINED SCROLL REGION** 1 line to whole screen ■ **SCROLL** up or down.
■ **FILL SCREEN** any character.
■ **CHANGE BACKGROUND**
■ **CHANGE FOREGROUND**
■ **INVERSE VIDEO** ■ **FLASH SCREEN**
■ **CLEAR SCREEN** without changing print position.

Supplied on tape with a **6K DEMO PROGRAM** and a FULL instruction booklet

ONLY £5.95

16K Spectrum GOLF

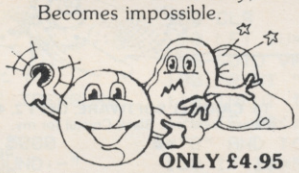
Hi-Res Full colour graphics. A game for 1 or 2 players, All the features of a full size course. THE family game. *(Reviewed Sinclair User Oct '82)*



ONLY £3.75

GNASHER 16K

THE ULTIMATE MAZE GAME. Ghosts, Energy Pills, Bonus Fruit, Sound, Colour + much more. Starts easy, Becomes impossible.



ONLY £4.95

Send to: **R & R SOFTWARE (SU)**
34, Bourton Road,
GLOUCESTER GL4 0LE
Tel: GLOS (0452) 502819

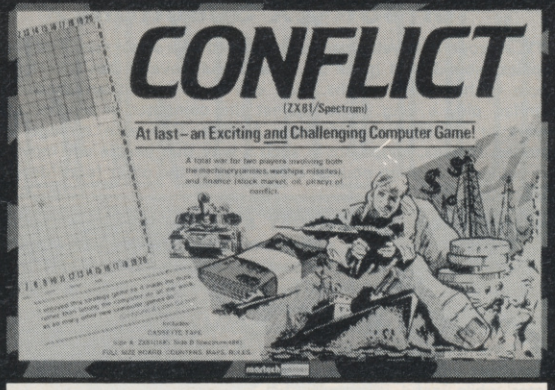
48 HOUR DISPATCH
Overseas + 10% please
Large Dealer Discounts

ZX SPECTRUM

NOW PLAYING

. . . A SPECTACULAR DOUBLE BILL

SPECTRUM (48K), ZX81 (16K), BBC 'B' DRAGON 32, COMMODORE 64, ATARI



Continuing for the season
YOUR SELF and ANNE UTHER
in a fantastic game of

WAR

. . . a powerful experience . . .

. . . a world on the brink of holocaust!

—a completely unique two player computer moderated board game of cunning and strategy. You will experience all the strain and excitement of having total control of a nations resources and military forces in time of crisis. Will you achieve victory . . . or the disaster of defeat!

The latest science fiction EPIC starring
BUG RAMPOKE and LEN STRING
in a brilliant game of

UNIVERSAL DESTRUCTION

. . . mind blowing excitement . . .

. . . a war between two distant galaxies!

—an intense two player computer moderated board game which makes you the all powerful leader of your galaxys destiny. How quickly can you understand the forces at play—and rid the universe of your enemies presence. Definitely not for the early to bedders!

DONT MISS THEM . . .
at your local outlets now!

Version 1: ZX81 (16K)/Spectrum (48K) £11.95
Version 2: BBC 'B'/Dragon 32 £14.75
Version 3: Commodore 64/Atari £14.75

or mail orders (inc. P & P) to our box office:

martech games Dept SU

9 Dillingburgh Rd., Eastbourne, Sussex BN20 8LY

DOCIMODUS

Games and serious software for 48K ZX Spectrum

CITY. A property development game played on a street map. Full colour graphics, sound, mid game saves and multi-levels. Can take from a couple of hours to months. You can race against an accelerated calendar, play a long game against the computer or against other players or combinations of these factors. Can your arrange your factories, houses, shops etc in such a way that people will move in? Can you earn a million pounds before any of the other four "development companies"? *City* **£7.95**

MULTIPLE ACCOUNT BUDGET SYSTEM. This accounting and budgeting system handles a large variable number of individual item accounts and up to 1000 transactions per file with no limit on the number of files. Comments can be added to the transactions and each item can have up to 6 lines of comments. Each item description has a budget profile which allows complex analysis and forward projection of cash flow trends. Periodic totals for items, item groups, income, expenditure or combinations of these factors can be produced. A ZX Printer, while useful, is not essential. *MABS* **£9.95**

ASSOCIATIVE DATABASE SYSTEM. After looking very closely at conventional information storage we realised that data in an unstructured form can only be held in a database system when that database is totally flexible and capable of adapting to the requirements of the user as it is used. ADBS provides such a system of data storage, and a retrieval system which works by association rather than search. (Though a search system is also provided). External file linkage extends the capacity of ADBS to infinity and linkage to other database programs is possible. *ADBS* **£13.95**

DOCIMODUS

161 Walmersley Road, Bury, Lancashire BL9 5DE

CARNELL SOFTWARE

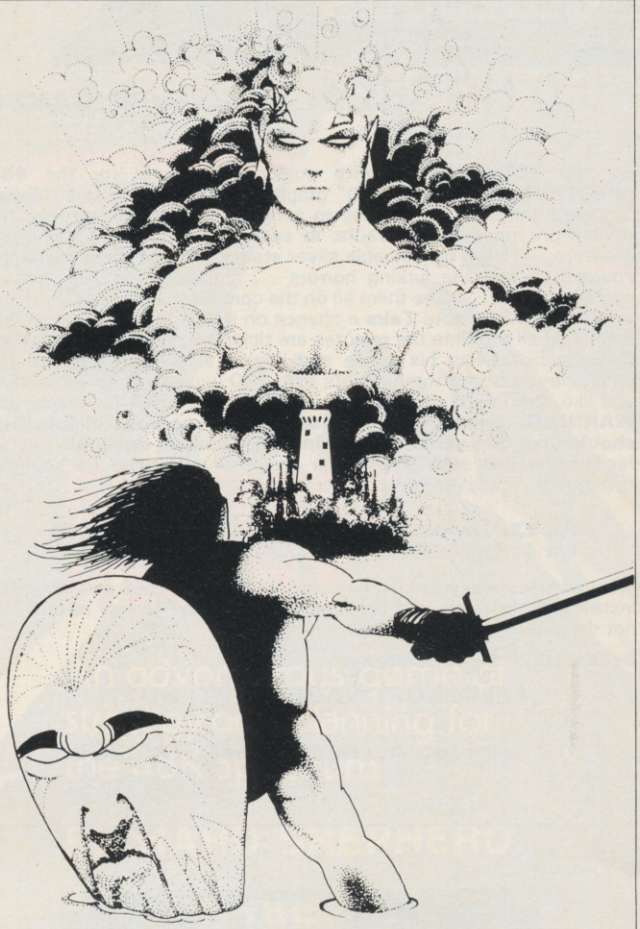
Carnell Software seek Z-80 programmers to assist on a free-lance basis with existing projects.

ALSO

We require original programs to supplement our catalogue. If you have an exciting new program, top royalties will be paid.

Apply to:
CARNELL SOFTWARE
4 Staunton Road,
Slough, Berkshire

SPECTRUM 48K : ZX81 16K SIX PART ADVENTURE



BLACK CRYSTAL

THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX-81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal.

By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

Real time monster battles. Superb graphics. Save game feature. All six parts are supplied together on cassette, boxed with instruction booklet.

SPECTRUM 48K: 180K OF PROGRAM IN SIX PARTS — ONLY £7.50
ZX81 16K: OVER 100K OF PROGRAM IN SEVEN PARTS — ONLY £7.50
WHY PAY MORE FOR LESS OF AN ADVENTURE

To: **CARNELL SOFTWARE, DEPT 2, 4 STAUNTON RD, SLOUGH, SL2 1NT.**
Please send me: Black Crystal for my,

Spectrum 48K £7.50

ZX8 16K £7.50

I enclose a cheque/postal order (payable to Carnell Software) for £

NAME .....

ADDRESS .....

.....

TRADE ENQUIRIES WELCOME

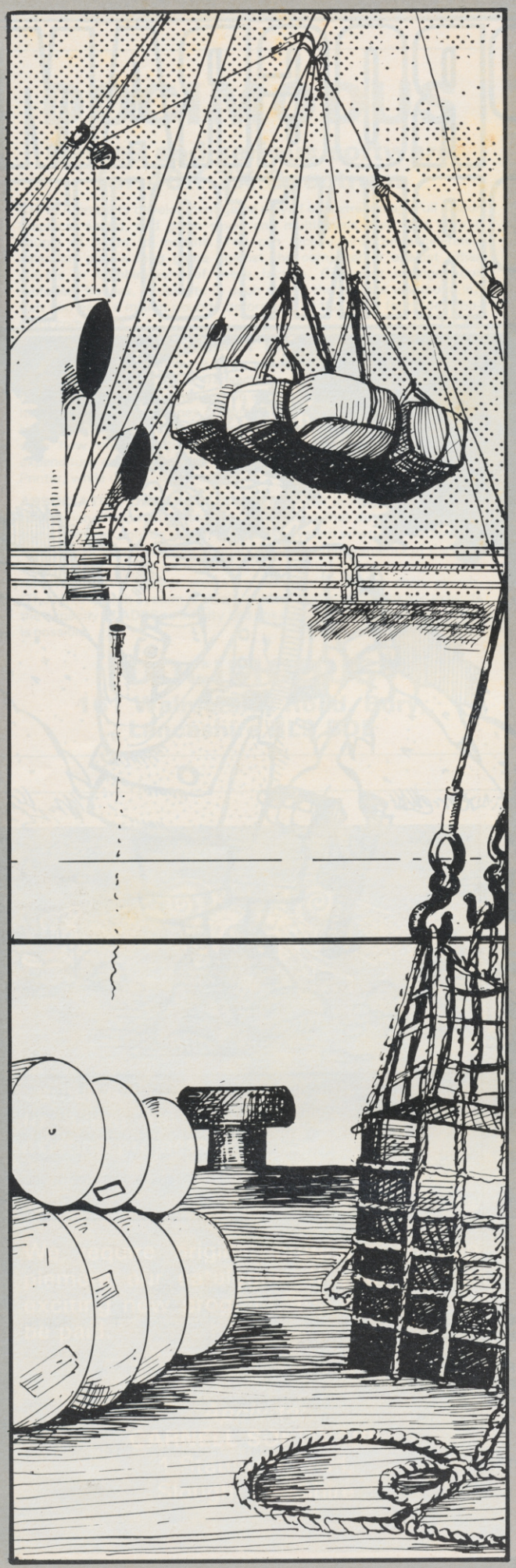
PROGRAM PRINTOUT

1K ADVENTURE

DAVID CLARK of Earlsferry, Fife has written a mini-adventure for the 1K ZX-81. You start with 500 strength points and 0 treasure points.

Finding a potion will increase your strength; finding treasure will increase your wealth. When you meet a monster you must decided whether to fight or bribe it, depending on your points. After each turn, press a key to proceed in the adventure.

```
   5 SAVE "1K ADVENTURe"
  10 LET S=VAL "500"
  20 LET T=PI-PI
  30 LET TU=PI/PI
  40 PRINT "TURN ";TU;" TREASURE
";T;" STRENGTH ";S
  43 IF S<=0 THEN GOTO 5000
  45 PRINT "YOU HAVE FOUND:-"
  50 LET X=INT (RND*VAL "75")
  60 LET H=INT (RND*INT PI)+PI/P
I
  65 GOSUB H*100
  70 LET S=S-10
  80 CLS
  90 LET TU=TU+1
  95 GOTO VAL "40"
 100 PRINT "A MONSTER.F/B?"
 110 INPUT I$
 120 IF I$<>"F" AND I$<>"B" OR I
$="B" AND T<X THEN GOTO 110
 130 IF I$="F" THEN LET S=S-X
 140 IF I$="B" THEN LET T=T-X
 150 GOSUB 2000
 190 RETURN
 200 PRINT "A POTION"
 210 LET S=S+X
 220 GOSUB VAL "2000"
 230 RETURN
 300 PRINT "TREASURE.IT IS WORTH
";X
 310 LET T=T+X
 350 GOSUB VAL "2000"
 400 RETURN
2000 IF INKEY$="" THEN GOTO 2000
2010 RETURN
5000 CLS
5010 PRINT "YOU HAVE DIED.YOU S$
RVIVED:";TU;" TURNS"
```



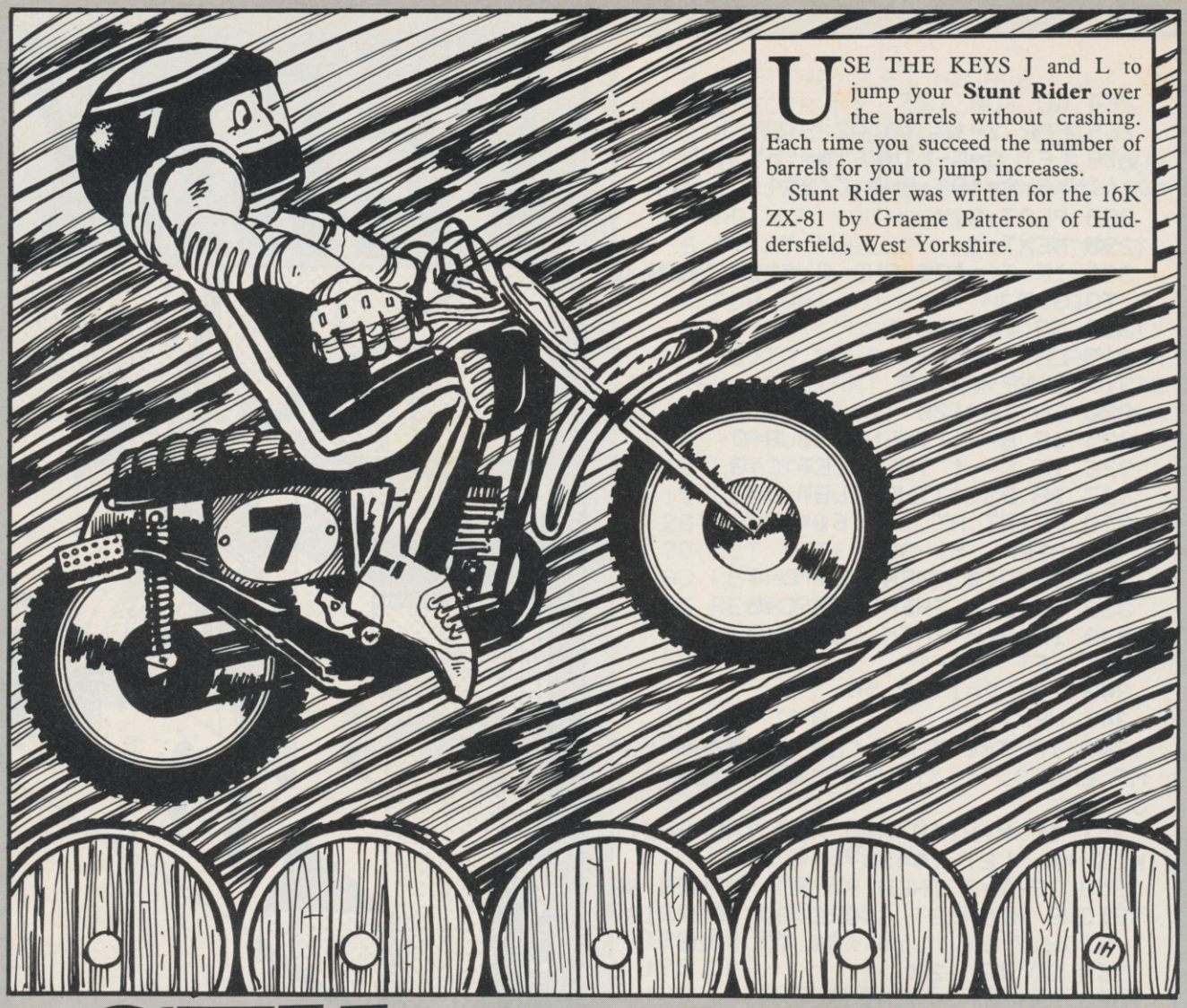
```
   2 LET Y=0: LET HIGH=6: LET Y$
="ZX SPECTRUM"
   3 PAPER 5: BORDER 4: CLS
   5 INPUT AT 21,0;"TELL ME YOUR
 NAME ?";Z$: IF Z$=Y$ THEN PRINT
 "OH NO,NOT YOU AGAIN!!"
   6 PRINT "HELLO ";Z$'" TIME TO
 PLAY FERRY"
   7 FOR Q=1 TO 220: NEXT Q
   8 PRINT '"USE<5>TO MOVE LEFT"
'"USE<8>TO MOVE RIGHT"''"PRESS A
NY KEY TO START.": FOR Q=1 TO 22
0: NEXT Q: PRINT ''TAB 10;"GOOD
LUCK": PAUSE 0
  10 LET T=2
  15 LET LM=-1: LET QZ=166
  20 LET X=0
  30 LET T=T+1
  33 LET LM=LM+1: LET QZ=QZ-8
  35 RESTORE
  40 LET G=25
  50 LET B=4

  60 LET C=B
  70 LET D=C
  80 LET F$="■"
  90 LET E=120
 100 LET B$="aaaaa"
 110 LET C$=B$
 120 LET D$=B$
 121 GO SUB 125
 122 GO TO 165
 125 CLS
 130 IF B=0 AND C=0 AND D=0 AND
T>0 AND Y>=QZ THEN FOR W=1 TO 8:
 READ D,P: BEEP D,P: NEXT W: GO
TO 30
 131 IF X=0 THEN GO TO 135
 132 PRINT TAB 17;: FOR Q=1 TO X
: PRINT "a";: NEXT Q
 135 PRINT AT 0,0;"SHIPS ";T;AT
LM,14;"■■"
 140 PRINT AT LM+1,15;F$;AT 20,3
;F$;AT 20,13;F$;AT 20,23;F$
 150 PRINT AT 21,3;B$(1 TO B);AT
 21,13;C$(1 TO C);AT 21,23;D$(1
TO D)
 160 RETURN
 165 LET E=10+INT (RND*200)
 170 FOR Y=QZ TO 16 STEP -1
 180 LET E=E-(INKEY$="5" AND E>1
)+(INKEY$="8" AND E<254)
 200 PLOT E,Y
 210 NEXT Y
 230 IF E>23 AND E<28 THEN LET B
=B-1: IF B>=0 THEN GO TO 263
 240 IF E>104 AND E<109 THEN LET
 C=C-1: IF C>=0 THEN GO TO 263
 250 IF E>183 AND E<188 THEN LET
 D=D-1: IF D>=0 THEN GO TO 263
 262 GO TO 330
 263 BEEP .2,15: LET G=E
```

FERRY

```
 264 GO SUB 125
 265 FOR Y=16 TO 02 STEP 1
 270 LET G=G-(INKEY$="5" AND G>1
)+(INKEY$="8" AND G<254)
 290 PLOT G,Y
 295 NEXT Y
 300 IF G<=125 AND G>=119 THEN G
O TO 315
 310 GO TO 330
 315 LET X=X+1
 317 BEEP .2,15
 320 GO TO 120
 325 IF B=-1 THEN LET B=0
 326 IF C=-1 THEN LET C=0
 327 IF D=-1 THEN LET D=0
 330 PRINT AT 10,16;"CRASH"
 331 BEEP .5,-30
 338 IF D<0 THEN LET D=0
 339 IF C<0 THEN LET C=0
 340 IF B<0 THEN LET B=0
 341 LET T=T-1
 343 FOR P=1 TO 50
 344 NEXT P
 346 IF T=0 THEN CLS : PRINT "GA
ME ENDED."'''"YOUR SCORE ";Z$;" I
S ";X
 351 IF X>HIGH AND X>0 THEN LET
HIGH=X: LET Y$=Z$
 353 IF T=0 THEN PRINT '"THIS SE
SSIONS HIGHEST SCORE SO  FAR IS
";HIGH;" BY ";Y$: GO TO 1000
 360 GO TO 120
1000 PRINT '"AGAIN?(Y/N)"
1015 POKE 23658,8
1020 LET O$=INKEY$
1030 IF O$="N" THEN STOP
1040 IF O$<>"Y" THEN GO TO 1020
1050 GO TO 2
1100 DATA .1,11,.1,11,.4,14,.05,
13,.05,18,0.5,11,.05,16,1,22
2000 SAVE "FERRY" LINE 2100
2100 FOR i=0 TO 7: POKE USR "a"+
i,66: IF i=2 OR i=6 THEN POKE US
R "a"+i,255: NEXT i
```

MANOEUVRE your ferry from port to collect the crates at the three ports on the other side of the river. Once you have collected a crate you must return to base with it before collecting the next crate.

The game was written for the 16K Spectrum by Peter Stiles of Harrow, Middlesex. Letters to be entered in graphics mode are underlined.

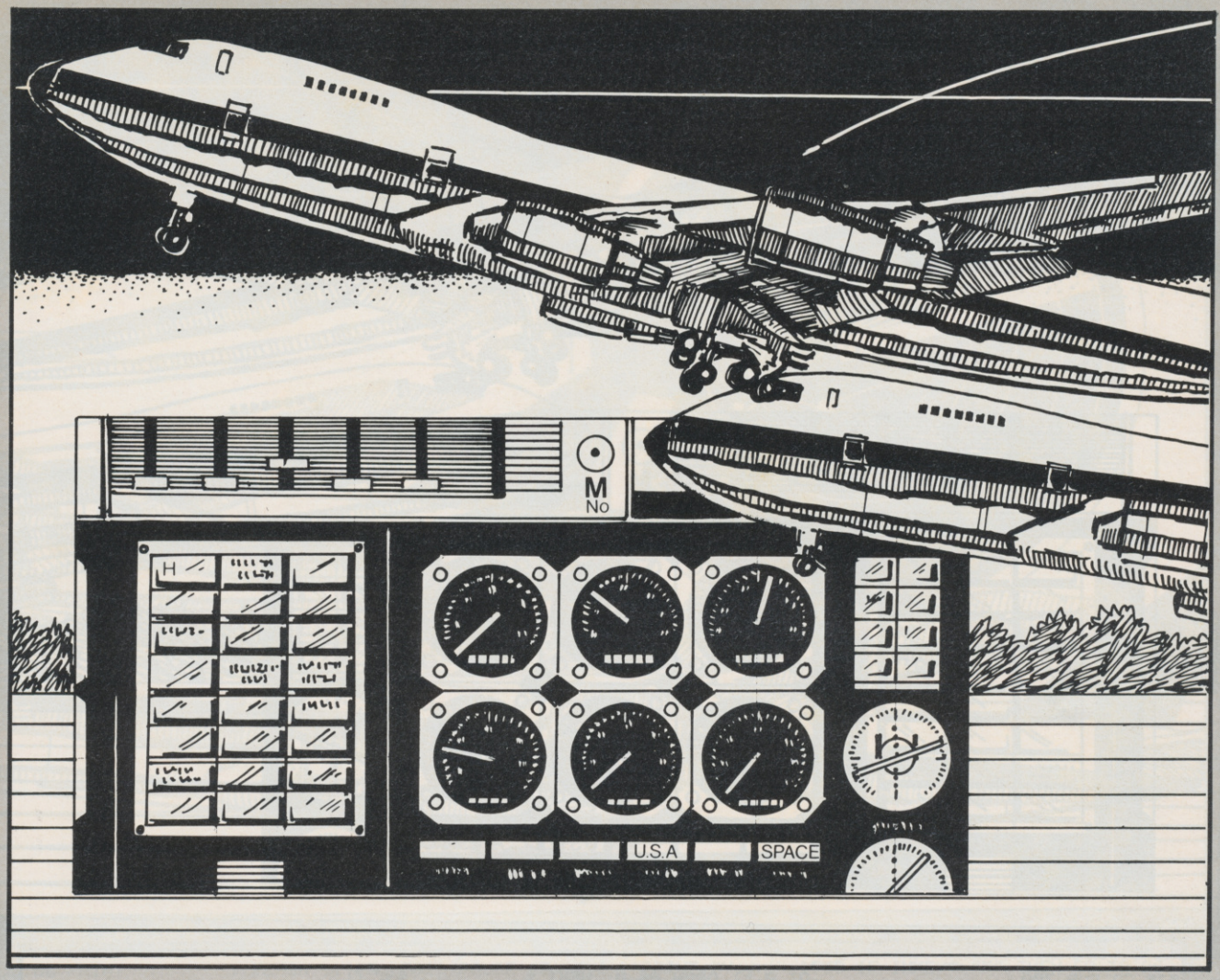


USE THE KEYS J and L to jump your **Stunt Rider** over the barrels without crashing. Each time you succeed the number of barrels for you to jump increases.

Stunt Rider was written for the 16K ZX-81 by Graeme Patterson of Huddersfield, West Yorkshire.

STUNT RIDER

```
  1 REM "STUNT"
  2 LET H=0
  3 LET S=0
  4 LET F=10
  6 GOSUB 500
  7 PRINT "**STUNT RIDER**"
 10 LET A=CODE " "
 20 LET B=CODE "="
 21 LET D=INT (RND*30)
 24 IF D<F+5 THEN LET D=F+5
 25 IF F>=23 THEN PRINT AT 20,F
-12;"                "
 29 PRINT AT 20,F+1;"
                  "
 30 PRINT AT CODE "+",CODE " ";
"
  "
 31 PRINT AT 20,D;"(9t)"
 40 PRINT AT B-1,A;"(96:))";AT
B,A;"(0:97:0)"
 45 PRINT AT B-1,A;"     ";AT B,
A;"     "
 50 PRINT AT 19,9;" /";AT 20,8;
" /"
 60 IF INKEY$="J" AND A>4 THEN
LET B=B-1
 61 IF INKEY$<>"J" AND A>4 THEN
 LET B=B+1
 62 IF INKEY$="L" THEN LET B=B+
1
 63 IF B>=20 THEN LET B=20
 64 IF F>=23 THEN LET F=10
 70 LET A=A+1
 71 PRINT AT 20,F;"0"
 72 IF A=D OR A+1=D OR A+2=D AN
D B=20 THEN PRINT AT 20,D;"CRASH
"
 73 IF A=D OR A+1=D OR A+2=D AN
D B=20 THEN GOTO 120
 74 IF A>5 AND A<=F AND B=20 TH
EN PRINT AT B,A;"CRASH"
 75 IF A>5 AND A<=F AND B=20 TH
EN GOTO 120
 76 IF A>5 AND A>F AND B=20 THE
N PRINT AT 20,F+4;"
                  "
 77 IF A>5 AND A>F AND B=20 THE
N GOTO 103
 79 GOTO 21
103 LET S=S+1
104 PRINT AT 1,5;"JUMPS=";S;AT
2,5;"HI=";H
105 LET F=F+1
107 GOTO 10
120 PRINT AT 10,10;"GAME OVER"
121 PAUSE 80
122 CLS
130 IF H>=S THEN GOTO 3
131 LET H=S
135 PRINT "YOU HAVE JUMPED MOST
 BARRELS,INPUT NAME."
140 INPUT N$
145 CLS
150 PRINT AT 1,0;"MOST JUMPS=";
H;AT 3,0;"**********BY:";N$
160 PAUSE 150
165 CLS
170 GOTO 3
500 PRINT AT 0,5;"**************
";AT 1,5;"*STUNT RIDER*";AT 2,5;
"**************"
501 PRINT AT 4,0;"JUMP: KEY""J"
"";AT 6,0;"DESCEND: DEPRESS KEY
""J""";AT 8,0;"STEEP DESCENT: KE
Y ""L"""
502 PRINT AT 10,0;"TRY TO JUMP
THE BARRELS AND      LAND YOUR VE
HICLE BEFORE THE ""▚""
503 PRINT AT 13,0;"IF YOU JUMP
SUCCESSFULLY THEN    YOU WILL LEN
GTHEN THE NUMBER OF  BARRELS."
504 PRINT AT 17,0;"IF YOU MANAG
E TO JUMP 13 BARRELS THEN THE NO
. OF BARRELS GOES    BACK TO 1."
505 PRINT AT 20,0;"IF YOU PASS
THE ""▚""THEN THE     GAME ENDS.
"
510 PAUSE 400
511 CLS
512 RETURN
```



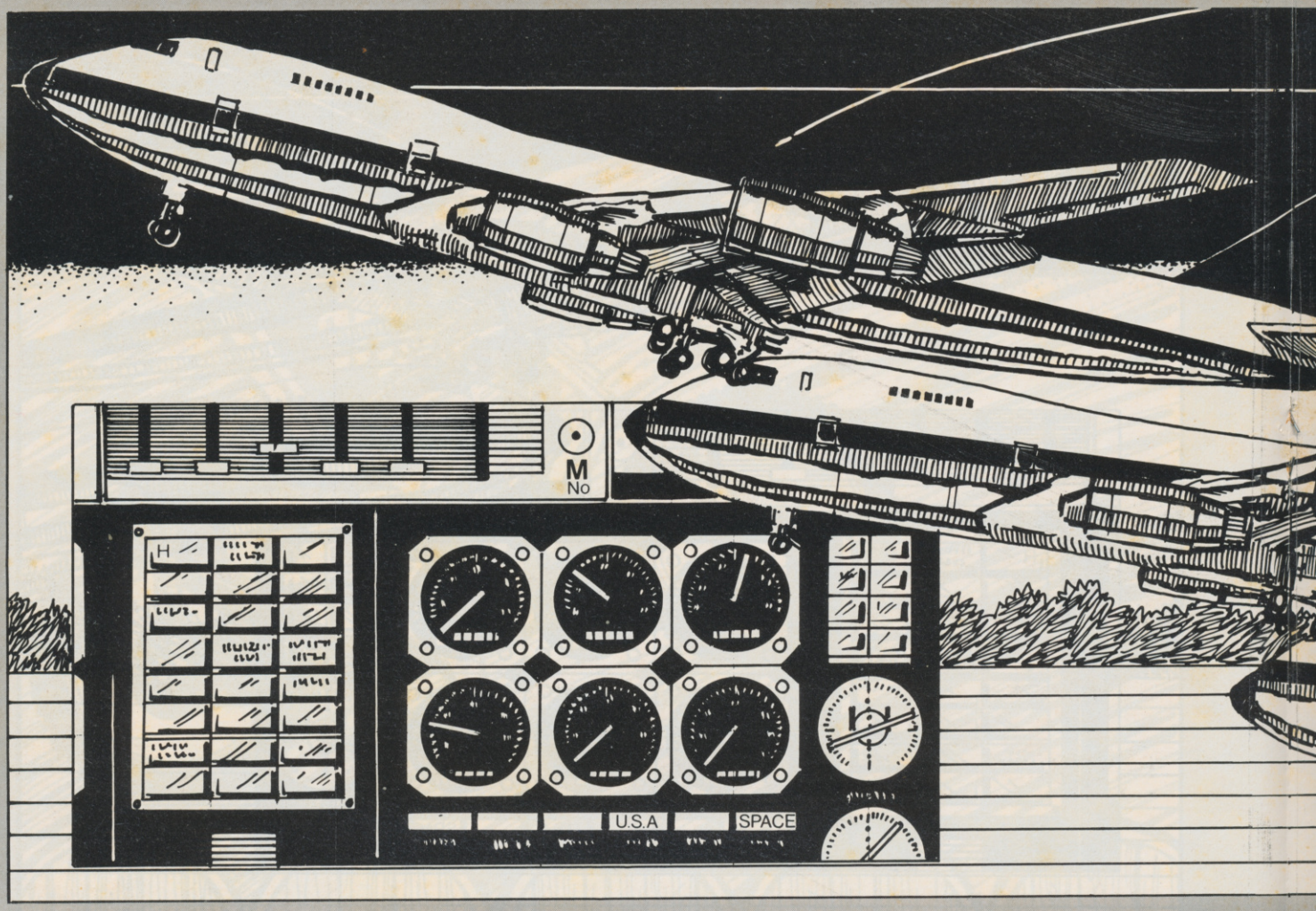
AIRPLANE

AIRPLANE simulates an aeroplane flight from London to one of 10 airports round the world. The screen displays your control panel, complete with information about speed and course.

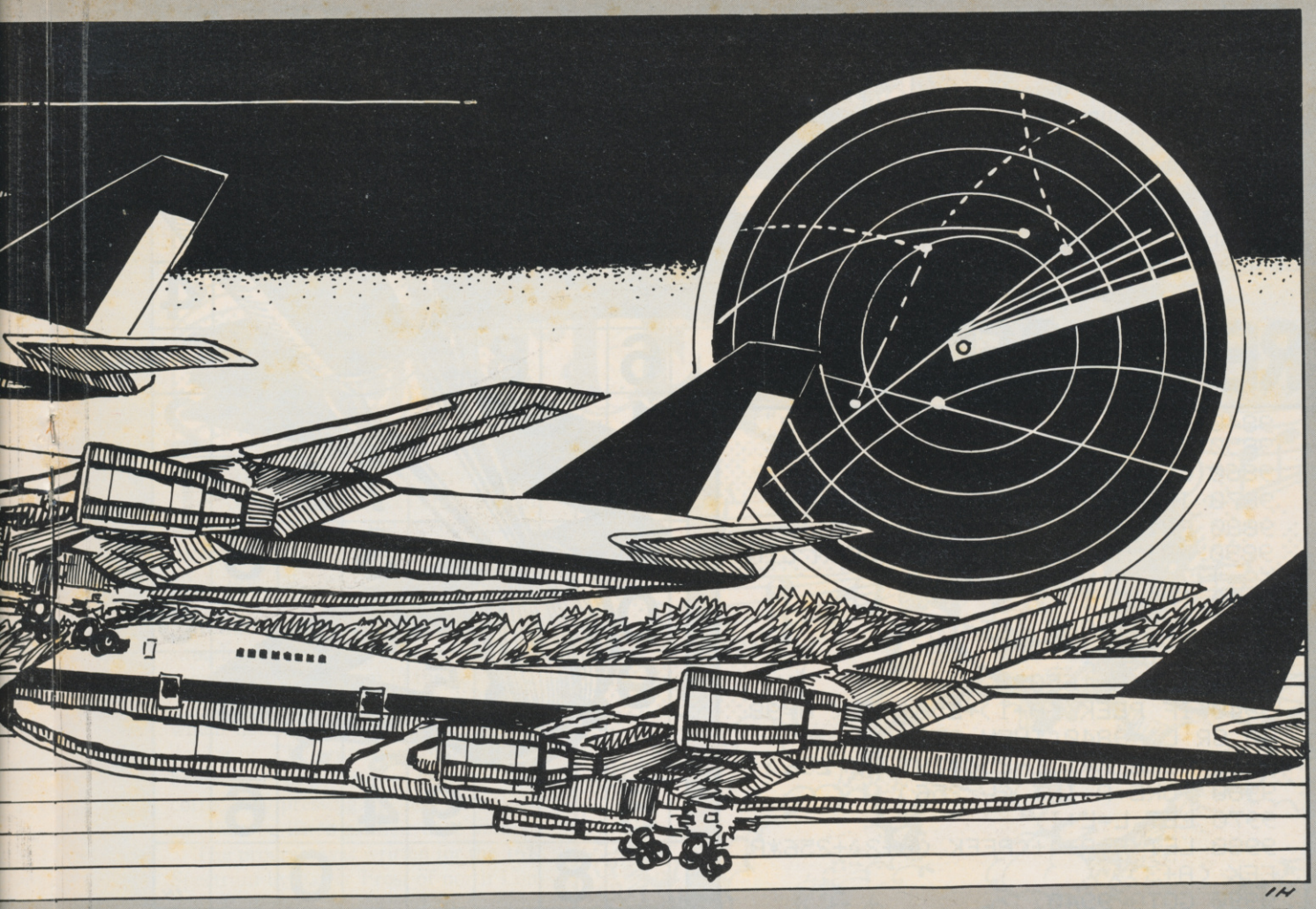
You are given the opportunity to change your speed, height and course. If you choose not to alter any of them, enter "0". Keep your changes within the defined limits and look carefully at the readings displayed before making a change. You have no second chances and a slight mistake will lead to a crash.

The program was written for the 16K Spectrum by David Courtier-Dutton of Bradfield, Berkshire.

```
10 LET zx=0: LET x=0: LET y=0: LET z=0
20 GO SUB 1020
30 GO SUB 9500
40 LET m=1: LET tr=w: BORDER 6: PAPER 7: INK 2
50 PLOT 89,145: DRAW INK 3;7,0: PLOT (89+INT l/50),145: DRAW INK 3;INT w/50,0
60 PRINT AT 17,15;"DESTINATION"
70 LET a=0: LET s=0: LET d=0: LET r=0: LET c=0: LET f=29: LET n=0
80 OVER 1: INK 2: PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175
90 PRINT AT 20,0; INK 1;"FUEL"
100 PLOT 32,0: DRAW 0,16: PLOT 32,8: DRAW 223,0
110 PRINT AT 20,4; INK 3;"0  50  100  150  200  250 300"
120 PLOT 88,16: DRAW 0,159: PLOT 0,144: DRAW 255,0
130 PRINT AT 14,1; INK 1;"ALTITUDE"
140 PRINT AT 10,3; INK 1;"RANGE"
150 PRINT AT 2,2; INK 1;"SPEED"
160 PRINT AT 6,1; INK 1;"TAIL FLAP"
170 PRINT AT 0,0; INK 3;"INSTRUMENTS"
180 PRINT AT 12,0; INK 1;"RUNWAY LEFT"
190 PRINT AT 18,0; INK 1;"FLAP ANGLE"
200 PRINT AT 8,1; INK 1;"R/BEARING"
210 PRINT AT 4,0; INK 1;"ACCELERATE"
220 PRINT AT 16,1; INK 1;"DROP RATE"
230 PLOT 89,95: DRAW 166,0: PLOT 0,160: DRAW 88,0: PLOT 89,112: DRAW 166,0
240 FOR t=32 TO 128 STEP 16: PLOT 0,t: DRAW 86,0: NEXT t
250 PRINT AT 21,4;"                ": OVER 0: GO SUB 700
300 IF s<150 AND a>0 THEN GO TO 5000
310 PRINT AT 5,13;"Increase/Decrease";AT 6,13;"thrust +75/-75?"
320 INPUT x: IF x>75 THEN LET x=75
330 IF x<-75 THEN LET x=-75
340 LET s=s+x: LET c=x: LET x=0: IF s>600 THEN LET s=600
350 LET s=s-5: IF s<0 THEN LET s=0
360 LET l=l-INT (1.25*(s*(1-d/100)))
```




```
370 575 GO SUB 700
380 578 IF s<150 AND a>0 THEN GO TO
    5000
390 580 LET x=0: PRINT AT 5;13;"Cha
    n9e flaP an9le?";AT 6,13;"50/-50
          ": INPUT y: LET n=n+y:
    IF n>50 THEN LET n=50
400 581 IF n<-50 THEN LET n=-50
410 582 LET a=a+INT (3.06*n): IF a<
    -5 THEN GO TO 5020
420 583 IF a>=500 THEN LET a=500
430 585 IF a<4 AND l>100 THEN LET a
    =0
440 590 LET r=INT (3.06*n): LET s=s
    -n
450 595 IF a<0 AND a>=-5 THEN LET a
    =0
460 600 GO SUB 700
470 605 LET zx=1
480 610 PRINT AT 5,13;"Alter tail f
    laP?  ";AT 6,13;"+45/-45": INPUT
    z: LET d=d+z: IF Pe>179 THEN LE
    T Pe=-179
490 612 IF Pe<-179 THEN LET Pe=179
500 620 LET Pe=Pe-d
510 630 IF l<=0 THEN LET w=w-s
520 635 IF f<=0 THEN GO TO 5040
530 640 IF a<0 AND l>0 THEN GO TO 5
    080
540 645 IF a<=0 AND Pe<>0 AND l<=25
    0 THEN GO TO 5100
550 660 LET f=f-INT ((n/10+s/20)/ (
    e/2)): IF f<=0 THEN GO TO 5040
560 670 IF l>400 AND l<500 AND a>5
    AND a<50 THEN LET a=100
570 675 IF s>230 AND a<=0 THEN LET
    a=50
580 680 IF w<=0 THEN GO TO 5060

  700 PRINT AT 3,1; INK 0;s;"  ";
    AT 15,1;a;"  ";AT 11,1;l;"  ";AT
    7,1;d;"  ";AT 19,1;n;"  ";AT 5,
    1;c;"  ";AT 17,1;r;"  ";AT 9,1;P
    e;"  ";AT 13,1;w;"  "
710 810 FOR t=16 TO 144 STEP 16: PL
    OT 0,t: DRAW 86,0: NEXT t
720 860 PRINT AT 8,12; INK 4;"  -
    R/BEARING  +"
730 880 PRINT AT 9,12;"
                "
740 890 PRINT AT 9,21;"o": PRINT AT
    9,21-INT (Pe/20);"^"
750 892 IF zx<>0 THEN GO TO 900
760 895 RETURN
800 900 PLOT INK 0;INT ((m-l)/50)+8
    9,INT a/18+146
810 905 LET zx=0
820 910 PRINT AT 21,f;"   "
830 920 IF a<=0 AND w>=0 AND f>0 AN
    D Pe=0 AND l<0 AND s<=0 AND S>=-
    1 THEN GO TO 6000
840 935 IF a<=40 THEN PRINT AT 16,1
    5; INK 2; PAPER 7; FLASH 1;"ALTI
    TUDE"
850 940 IF s<165 THEN PRINT AT 14,1
    5; INK 2; PAPER 7; FLASH 1;"SPEE
    D"
860 945 IF l<100 THEN PRINT AT 12,1
    5; INK 2; PAPER 7; FLASH 1;"RANG
    E"
870 950 IF l<300 AND Pe<>0 THEN PRI
    NT AT 13,15; INK 2; PAPER 7; FLA
    SH 1;"R/BEARING"
880 955 IF w<200 THEN PRINT AT 12,1
    5; INK 2; PAPER 7; FLASH 1;"RUNW
    AY LEFT"
890 960 FOR q=1 TO 100: BEEP .007,-
    22: NEXT q: FLASH 0: PRINT AT 12
    ,15;"                ";AT 13,15;"
                ";AT 14,15;"
        ";AT 15,15;"                ";
    AT 16,15;"                "
900 1000 GO TO 500
1000 1020 PAPER 0: INK 5: BORDER 2: C
    LS
1010 1030 PRINT AT 10,10;"INSTRUCTION
    S? [y/n]"
1020 1035 IF INKEY$="n" THEN RETURN
1030 1036 IF INKEY$="" THEN GO TO 103
    5
1040 1037 CLS
1050 1040 BEEP .3,0: BEEP .3,0: BEEP
    .3,0: BEEP .8,-5
1060 1050 BEEP .3,3: BEEP .3,3: BEEP
    .3,3: BEEP .8,-2
1070 1060 FOR m=-7 TO 5: BEEP .1,m: N
    EXT m: PAUSE 20: BEEP .17,15: PA
    USE 15: BEEP .4,-25
1080 1070 PRINT AT 10,12; INK 2;"AIRP
    LANE": PAUSE 150: CLS
1090 1080 PRINT " AIRPLANE simulates
    an airoPlaneflight from London a
    irPort to   one of ten other air
    ports aroundthe world,the choice
     of which isyours.However flyin9
     a Plane is not as easy as you m
    ay think,so read these instructi
    ons          carefully"
1100 1100 PRINT ''';"    "; FLASH 1;"
    PRESS ANY KEY TO CONTINUE"
1110 1120 IF INKEY$="" THEN GO TO 112
    0
1120 1130 CLS : PRINT ; FLASH 1;"BEAR
     IN MIND"; FLASH 0;'"You will st
    all at under 150 KMH so do not t
    ake off before this  sPeed is at
    tained"
1130 1140 PRINT '"To chan9e altitude
    (uP) or negative (d
    own) value   must be aPPlied to
    the flaPs;   your altitude will
    chan9e by    three times the fla
    P an9le"
1140 1150 PRINT '"To alter course use
     your TAIL   FLAP,when the runwa
    y bearin9    [R/BEARING] is 0 yo
    u will be on"
1150 1155 PRINT "course.In the R/BEAR
    ING disPlay your destination is
    rePresented by 'o' and your actu
    al course by"
1160 1158 PRINT "'^';when the 'o' dis
    saPPears youwill be on course"
```



```
1160 PRINT ';"     "; FLASH 1;"PR
ESS ANY KEY TO CONTINUE"
1170 IF INKEY$="" THEN GO TO 117
0
1180 CLS : PRINT "Your speed wil
l decrease as you climb and incr
ease as you decendDue to air res
istance it will    decrease by 5
KMH after every    set of instruc
tions"
1190 PRINT '"The RUNWAY LEFT ref
ers to your  destination and if
this value isless than 0 you wil
l crash."
1200 PRINT '"Your position relat
ive to Londonand your destinatio
n is ploted  at the toP of the s
ceen to show your position at a
glance.The   distance you are fr
om your      destination is show'
n in the     RANGE readout"

1220 PRINT ;''"     "; FLASH 1;"P
RESS ANY KEY TO CONTINUE"
1230 IF INKEY$="" THEN GO TO 123
0
1235 CLS : PRINT "To land succes
sfully your speed must equal 0,y
our altitude must equal 0,and yo
u MUST be on the  runway"
1240 PRINT '"Flashing instructio
ns will help you to fly the Plan
e safely.                GOOD LUC
K!"
1250 PRINT ; INK 6;;''"TO REPEAT
  INSTRUCTIONS PRESS 'R'  PRESS A
NY OTHER KEY TO BEGIN"
1270 IF INKEY$="r" THEN CLS : GO
 TO 1080
1280 IF INKEY$="" THEN GO TO 127
0
4000 RETURN

5000 PAUSE 40: CLS : PRINT "You
stalled at ";s;" K/M/H and     c
rashed -USELESS": GO TO 5200
5020 PAUSE 40: CLS : PRINT "Your
 altitude is ";a;" meters so you
 have crashed -USELESS": GO TO 5
200
5040 PAUSE 40: CLS : PRINT "You
ran out of fuel  so you have cra
shed-USELESS": GO TO 5200
5060 PAUSE 40: CLS : PRINT "You
over shot the runway by ";ABS w;
" meters  so you have crashed -U
SELESS": GO TO 5200
5080 PAUSE 40: CLS : PRINT "You
tried to land ";l;" miles short
of the   runway   so you have cr
ashed-USELESS": GO TO 5200
5100 PAUSE 40: CLS : PRINT "You
have missed the runway completel
y by ";Pe;" degrees and have cra
shed -USELESS": GO TO 5200
5200 PAUSE 300: CLS : PRINT "Ano
ther flight?(y/n)": IF INKEY$="y
" THEN GO TO 10: STOP
5300 GO TO 10
6000 LET k=INT f/3
6092 LET sc=INT (110*(w/tr)): LE
T k=(2*k)+sc
6100 PAUSE 100: CLS : PRINT "Wel
l done!You scored ";INT k;" Poin
ts out of a Possible 100": STOP
8100 STOP
9500 INK 7: BORDER 2: PAPER 0: C
LS : PRINT "WHICH AIRPORT?": PRI
NT "0)Istanbul"'"1)Chicago"'"2)M
ilan"'"3)Moscow"'"4)New York"'"5
)Port Stanley"'"6)Oslo"'"7)Tel A
viv"'"8)Delhi"'"9)Toronto"

9505 INK 2: PAPER 7
9510 IF INKEY$="1" THEN GO TO 96
00
9520 IF INKEY$="2" THEN GO TO 96
20
9530 IF INKEY$="3" THEN GO TO 96
40
9540 IF INKEY$="4" THEN GO TO 96
60
9550 IF INKEY$="5" THEN GO TO 96
80
9560 IF INKEY$="6" THEN GO TO 97
00
9565 IF INKEY$="0" THEN GO TO 97
20
9570 IF INKEY$="7" THEN GO TO 97
40
9575 IF INKEY$="8" THEN GO TO 97
60
9580 IF INKEY$="9" THEN GO TO 97
80
9585 GO TO 9510
9600 CLS : LET l=4235: LET e=15:
 LET w=700: LET Pe=170: PRINT AT
 18,16;"CHICAGO": RETURN
9620 CLS : LET l=581: LET e=4: L
ET w=700: LET Pe=35: PRINT AT 18
,16;"MILAN": RETURN

9640 CLS : LET l=1549: LET e=9:
LET w=640: LET Pe=-10: PRINT AT
18,16;"MOSCOW": RETURN
9660 CLS : LET l=3500 : LET e=13
: LET w=750: LET Pe=170: PRINT A
T 18,16;"NEW YORK": RETURN

9680 CLS : LET l=7406 : LET e=24
: LET w=440: LET Pe=110: PRINT A
T 18,16;"PORT STANLEY": RETURN
9700 CLS : LET l=722 : LET e=5:
LET w=500: LET Pe=-30: PRINT AT
18,16;"OSLO": RETURN

9720 CLS : LET l=1562 : LET e=9:
 LET w=480: LET Pe=35: PRINT AT
18,16;"ISTANBUL": RETURN

9740 CLS : LET l=2230 : LET e=11
: LET w=650: LET Pe=40: PRINT AT
 18,16;"TEL AVIV": RETURN

9760 CLS : LET l=5203 : LET e=18
: LET w=510: LET Pe=34: PRINT AT
 18,16;"DELHI": RETURN
9780 CLS : LET l=3728 : LET e=14
: LET w=550: LET Pe=-150: PRINT
AT 18,16;"TORONTO": RETURN
```

RENUMBER

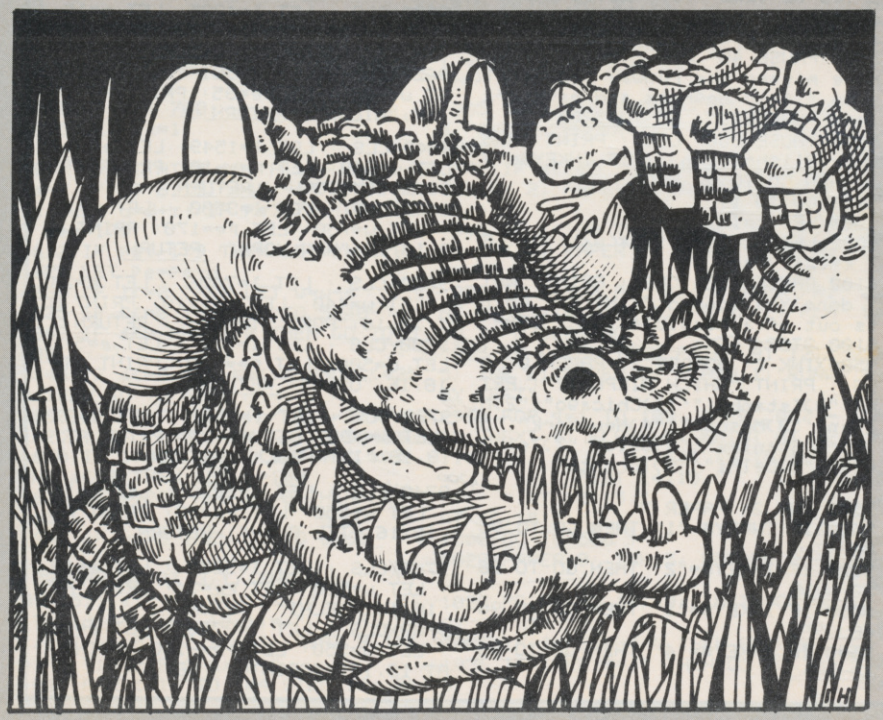
DAVID BARLOW of Liverpool has written this short **Renumber** routine for 16K ZX-81 users who want to make their programs look neater. The routine will change the line numbers of all the other lines in a program, beginning at the number you choose and increasing by a set amount. Remember that re-numbering will affect only line numbers. GOTOs and GOSUBs must be altered manually.

```
9840 PRINT "FIRST LINE NUMBER=";
9850 INPUT L
9860 LET L=ABS INT L
9870 IF L>=9840 THEN STOP
9880 PRINT L
9890 PRINT "INTERVAL BETWEEN LIN
ES=";
9900 INPUT I
9910 LET I=ABS INT I
9920 PRINT I
9930 LET A=16509
9940 IF PEEK (A+1)+256*PEEK A=98
40 OR L>=9840 THEN STOP
9950 POKE A+1,L-256*INT (L/256)
9960 POKE A,INT (L/256)
9970 LET L=L+I
9980 LET A=A+4+(PEEK (A+2)+256*P
EEK (A+3))
9990 GOTO 9940
```

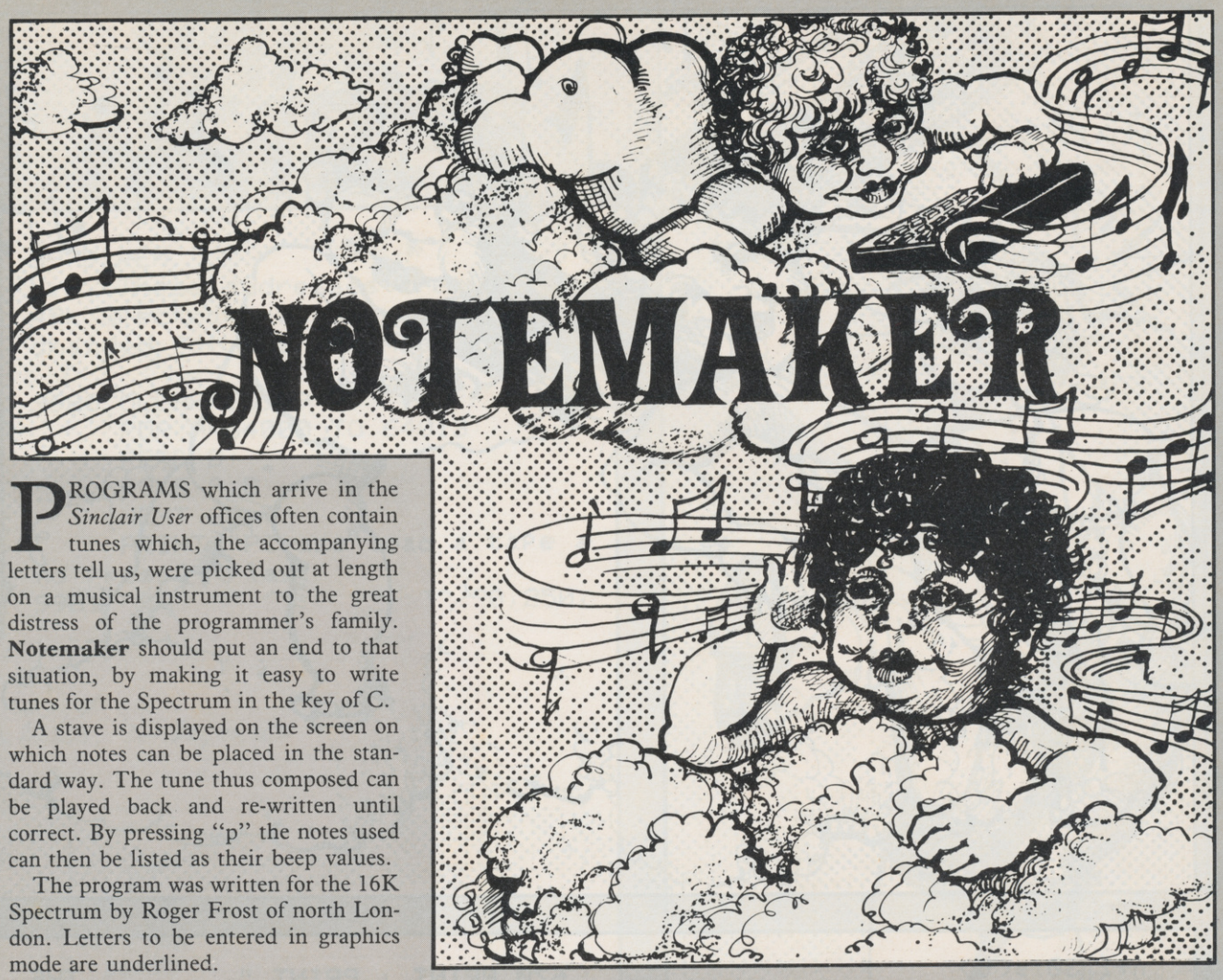
TASTY TOADS

YOU ARE the ravenous toad-eating crocodile at the bottom of the screen. Press 'P' to fire a venom blast which will gulp down one of those tasty toads passing overhead. The Society for the Protection of Toads, which objects to the wholesale slaughter, has erected a forcefield. Firing while a toad is behind it will result in all the frogs escaping, thus ending the game.

Tasty Toads was written for the 1K ZX-81 by Andrew Brewster of Rochester, Kent.



```
  1 REM "T"
  2 LET C=0
  3 LET A=0
  4 RAND
  5 FOR A=1 TO 5
  6 CLS
 10 LET M=18
 20 LET F=2+(INT (RND*8))
 30 FOR B=0 TO 20
 35 PRINT AT 6,0;"*********FORC
E*FIELD**********"
 40 PRINT AT 19,15;"(i.:96:i.)"
;AT 18,14;"(9y:3*sP:9t)";AT F,B;
"(i.:96:i.)";AT F+1,B;"(9t:i-:9y
)"
 50 IF M<F THEN LET M=18
 60 IF INKEY$="P" OR M<18 THEN
PRINT AT M,16;"."
 65 IF B=15 AND M=F THEN GOTO 1
50
 70 IF INKEY$="P" OR M<18 THEN
GOSUB 120
 80 PRINT AT F,B;" "
 90 NEXT B
100 NEXT A
120 PRINT AT M,16;" "
125 LET M=M-2
130 RETURN
150 PRINT AT M,B;" gulp ";AT M+
1,B;"      "
160 PAUSE 50
170 NEXT A
```



PROGRAMS which arrive in the *Sinclair User* offices often contain tunes which, the accompanying letters tell us, were picked out at length on a musical instrument to the great distress of the programmer's family. **Notemaker** should put an end to that situation, by making it easy to write tunes for the Spectrum in the key of C.

A stave is displayed on the screen on which notes can be placed in the standard way. The tune thus composed can be played back and re-written until correct. By pressing "p" the notes used can then be listed as their beep values.

The program was written for the 16K Spectrum by Roger Frost of north London. Letters to be entered in graphics mode are underlined.

```
  20 GO TO 660
  30 REM b=main counter
  40 IF b>=57 THEN GO TO 490
  50 LET b=b+1
  60 LET m(b)=y(n): LET n(b)=11-
n
  70 REM count/beep/print
  80 LET a=a+1
  90 IF a=30 THEN GO SUB 240
 100 INK ink: PRINT AT s+n(b),a;
"b": BEEP .3,m(b): PRINT AT s+n(
b)-1,a;("c" AND n(b)<>0): INK 0:
 RETURN
 110 REM memory gosub
 120 LET s=0: LET b1=b: LET a1=a
: LET a=1: LET ink=1+ink: IF ink
=3 THEN LET ink=0
 130 FOR b=2 TO b1
 140 GO SUB 70: PAUSE 15: NEXT b
 170 LET a=a1: LET b=b1: RETURN
 180 REM rub out gosub
 190 OVER 1

 200 GO SUB 100: OVER 0
 210 LET a=a-1: LET b=b-1: IF b=
29 THEN LET a=b: IF b=29 THEN LE
T s=0
 220 IF b=1 THEN RUN 690
 230 RETURN
 240 REM print position
 250 LET s=11: LET a=2: IF b=30
AND k$<>"m" THEN GO SUB 400
 260 RETURN
 270 REM instructions
 280 OVER 1
 290 IF s=11 THEN RETURN
 300 PRINT AT 14,1;"PRESS c TO C
ONTINUE"
 310 PRINT AT 15,1;"PRESS 1-9 FO
R NOTES"
 320 PRINT AT 16,1;"PRESS x TO R
UB-OUT "
 330 PRINT AT 17,1;"PRESS m FOR
 MEMORY"

 340 PRINT AT 18,1;"PRESS r TO R
E-RUN"
 350 PRINT AT 19,1;"PRESS s TO S
TOP    "
 360 PRINT AT 20,1;"PRESS p FOR
A PRINTOUT": RETURN
 370 GO SUB 280: PAUSE 0: GO SUB
 280  OVER 0: RETURN
 380 REM Print staves
 390 CLS : LET s=0
 400 LET t=10
 410 FOR n=s TO s+9 STEP 2
 420 PLOT 9,171-n*8: DRAW 236,0
 430 PRINT INK 2;AT n,0;g$(t+1);
AT n+1,0;g$(t);AT n,30;y(t+1);AT
```

```
 n+1,30;y(t)
 440 LET t=t-2: NEXT n
 450 PRINT INK 2;AT s+10,0;9$(1)
;AT s+10,30;y(1):
 460 PRINT AT 21,1;"PRESS i FOR
INSTRUCTIONS"

 470 PRINT AT s+10,1;" a a a a a
 a a a a a a a a a a "
 480 RETURN
 490 PAUSE 0
 500 LET k$=INKEY$
 510 IF k$="i" THEN GO SUB 370
 520 IF k$="x" THEN GO SUB 180
 530 IF k$="m" THEN GO SUB 110
 540 IF k$="r" THEN RUN 690
 550 IF k$="s" THEN STOP
 560 IF k$="P" THEN GO TO 620
 570 LET k=CODE INKEY$
 580 FOR n=1 TO 11
 590 IF k=k(n) THEN GO SUB 30
 600 NEXT n
 610 GO TO 490
 620 CLS
 630 PRINT "NOTE    BEEP No."
 640 FOR n=1 TO b: PRINT n;"    "
;m(n+1): NEXT n
 650 STOP
 660 INK 0: PAPER 7: BORDER 0: C
LS
 670 PRINT : PRINT "          THE
 NOTEMAKER          ": PRINT : P
RINT
 680 PRINT INK 0;"THIS ENABLES Y
OU TO PLAY A TUNE USING THE TOP
NUMBER KEYS (AND 9": PRINT : PRI
NT "YOU CAN PLAY IT BACK  USING
    ~MEMORY~(Key m)"
 690 DIM k(11): DIM y(11): DIM m
(60): DIM n(60)
 700 FOR x=1 TO 11: READ y(x): N
EXT x
 710 FOR n=1 TO 11: READ k(n): N
EXT n
 720 LET 9$="1234567890q"
 730 FOR a=USR "a" TO USR "a"+23
: READ n: POKE a,n: NEXT a
 740 LET ink=0: LET x=2: LET a=1
: LET b=1
 750 PRINT : PRINT : PRINT : PRI
NT : PRINT INK 2;"    PRESS ANY
KEY TO START": PAUSE 0
 760 GO SUB 390: GO TO 490
 770 DATA 0,2,4,5,7,9,11,12,14,1
6,17
 780 DATA 49,50,51,52,53,54,55,5
6,57,48,113
 790 DATA 0,0,0,0,255,0,0,0,4,4,
52,124,255,252,248,112,0,0,4,4,4
,4,4,4
```

TAPE HEADER

```
9979 REM
N.B. These addresses are for the
48k Spectrum and should be
changed for the 16k model.
9980 CLEAR 63999: FOR A=64000 TO 64013:
     READ B: POKE A,B: NEXT A:
     PRINT "Please load a tape a
nd Press"'"Play"'
9981 DATA 55,62,0,221,33,20,250,
17,17,0,205,86,5,201
9982 RANDOMIZE USR 64000
9983 LET A=64020: LET B=PEEK A:
     LET S=B
9984 IF B=0 THEN
     PRINT "Program          : ";
9985 IF B=1 THEN
     PRINT "Numeric array    : ";
9986 IF B=2 THEN
     PRINT "Character array  : ";
9987 IF B=3 THEN
     PRINT "Bytes            : ";
9988 FOR A=64021 TO 64030: LET B=PEEK A:
     PRINT CHR$ B;: NEXT A:
     PRINT
9989 LET B=PEEK A+256*PEEK (A+1)
:
     PRINT "Data length      : ";
B
9990 LET A=A+2: LET B=PEEK A+256*PEEK (A+1)
:
     IF S=3 THEN
     PRINT "Start address    : ";
B
9991 IF S<>0 THEN
     GO TO 9995
9992 IF B<1 OR B>9999 THEN
     GO TO 9994
9993 PRINT "Auto start at    : ";
B
9994 LET A=A+2: LET B=PEEK A+256*PEEK (A+1)
:
     PRINT "Prog/Vars length: ";
B
9995 PRINT :
     PAUSE 140: POKE 23692,255:
     GO TO 9982
```

JA SLATER of Bury, Lancashire has written a very useful utility program for the 48K Spectrum. **Tape Header** uses a small machine code subroutine to load the header data on a tape, then outputs that data to the screen.

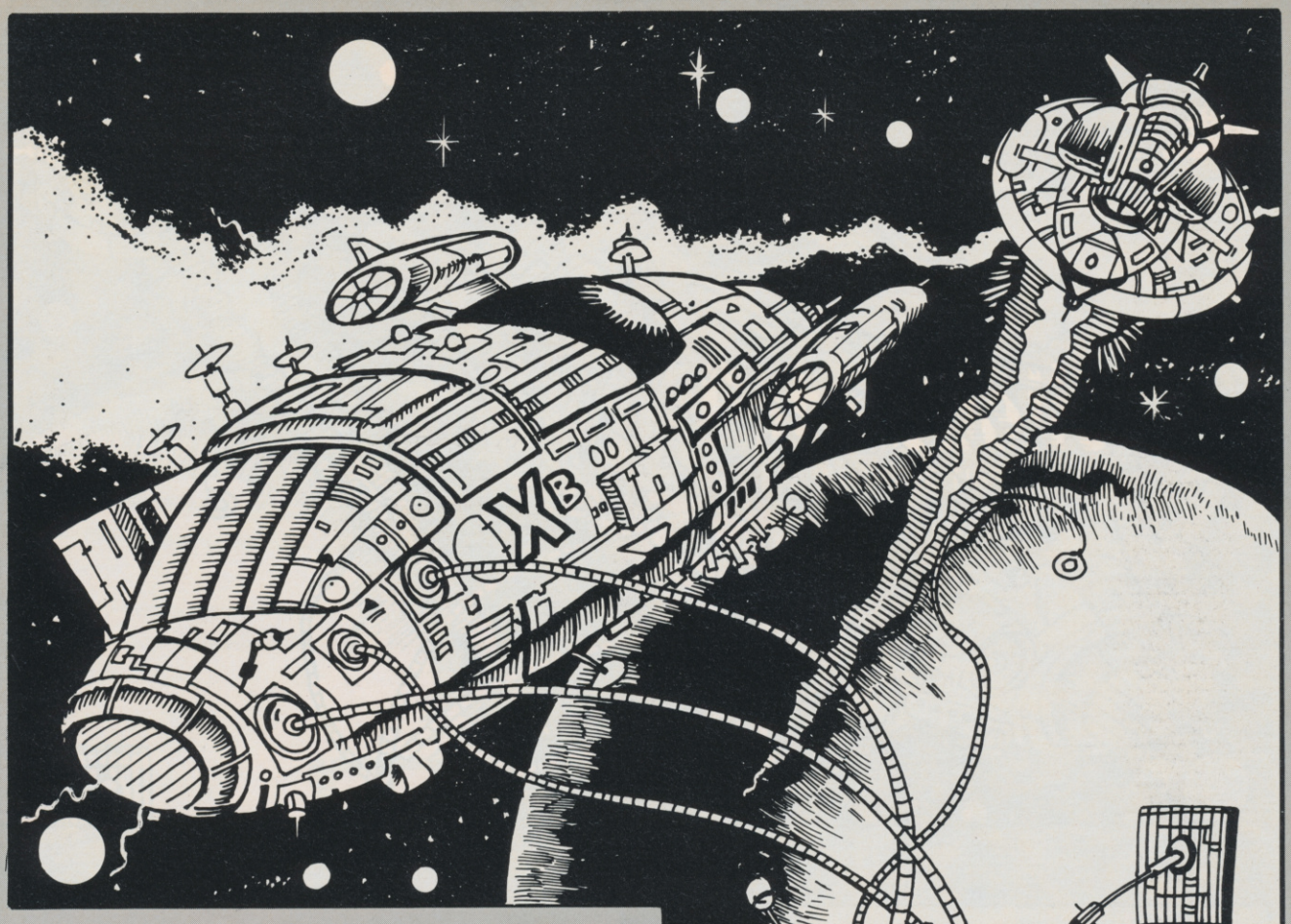
Details of the length of the data, the program name, start address — bytes only — and the auto-start line number — Basic programs only — are all given.

THE COMPUTER will print identical lines of inverse letters on the screen. It will then insert an inverse Ø in one of those lines. Almost immediately the lines will vanish and you will be asked on which line the Ø appeared.

This game requires all your concentration. Its writer, Peter Wilson, of Morpeth, Northumberland managed to score eight out of 10. That score seems to us to be almost impossible to beat (16K ZX-81).

ODD ONE

```
  1 REM odd one out
  2 LET S=0
  3 CLS
  4 LET T=12.5
  5 FOR Q=1 TO 10
 10 DIM A$(32)
 20 FOR N=1 TO 32
 30 PRINT AT 0,12;"ready";AT 0,
2;"      "
 40 LET A=INT (RND*26)+166
 50 LET A$(N)=CHR$ A
 60 NEXT N
 65 FOR P=1 TO 9
 67 PRINT AT P*2,0;P
 70 FOR O=1 TO 32
 80 PRINT AT P*2+1,O-1;A$(O);
 90 NEXT O
100 NEXT P
110 LET R=INT (RND*9)+1
120 LET RR=INT (RND*31)+1
130 PRINT AT R*2+1,RR;CHR$ 156
140 FOR N=1 TO T
150 NEXT N
160 CLS
170 PRINT "WHICH LINE HOLDS THE
odd one ?"
180 INPUT ANS
190 IF ANS=R THEN GOTO 250
200 PRINT "no-bad luck-IT WAS "
R
210 GOTO 255
250 PRINT "yes-";R;" IS correct

251 LET S=S+1
255 FOR N=1 TO 30
256 NEXT N
260 CLS
265 LET T=T-.8
270 NEXT Q
280 PRINT "YOU SCORED ";S;"/10"
290 PRINT AT 10,4;"ANOTHER GAME
? Y/N"
300 IF INKEY$="Y" THEN RUN
305 IF INKEY$="N" THEN STOP
310 GOTO 300
```

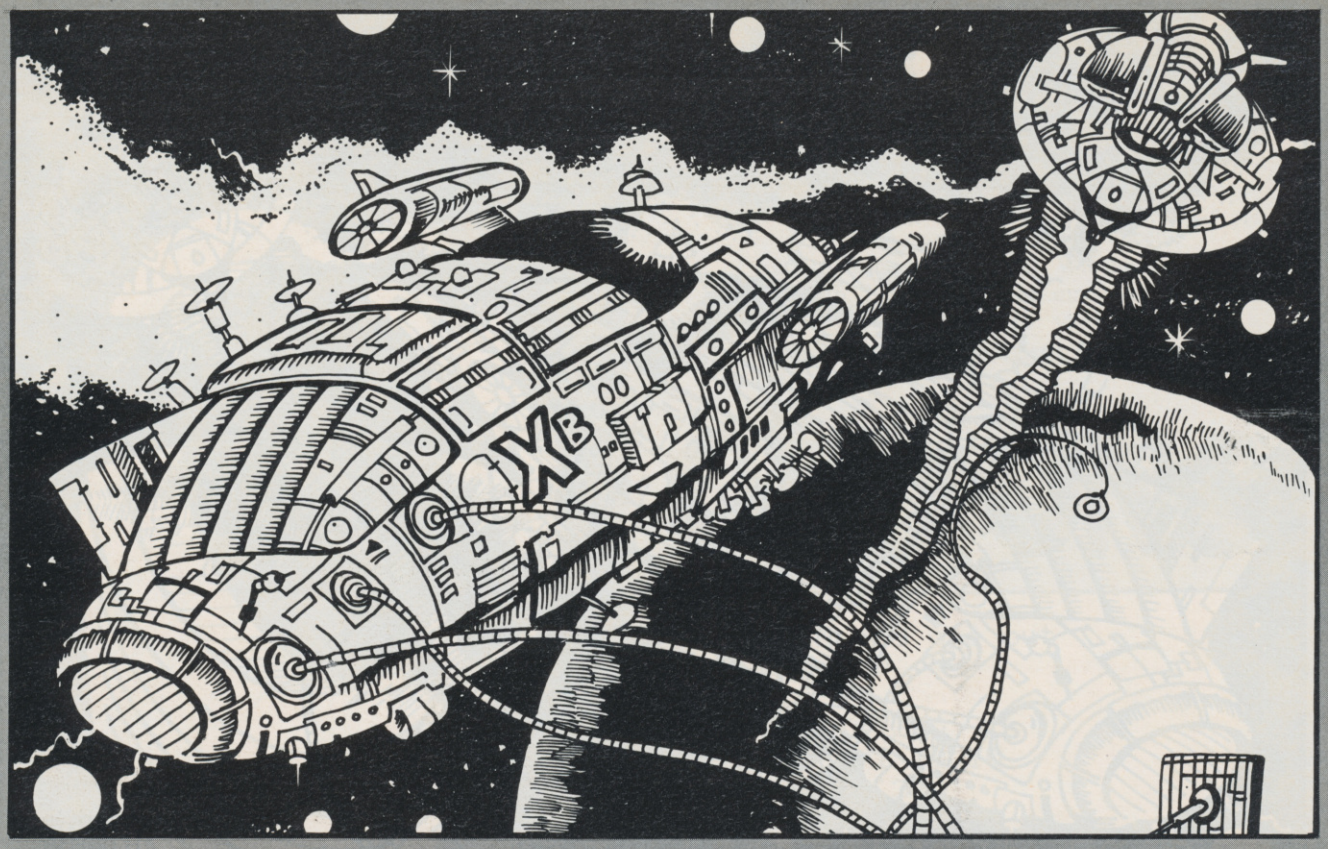


INTER STELLAR TRAFFIC

```
  1 LET P=INT (RND*30)
  2 LET Q=INT (RND*30)
  3 LET R=INT (RND*30)
  5 LET A=INT (RND*20)
  6 LET B=INT (RND*30)
  7 LET M=INT (RND*20)
  8 LET N=INT (RND*20)
  9 LET O=INT (RND*20)
 10 FOR F=0 TO 20
 20 PRINT "(32*isP)"
 30 NEXT F
 31 LET CO=0
 40 FOR F=0 TO 40
 50 PRINT AT INT (RND*20),INT (
RND*30);"(i.)"
 60 NEXT F
 62 DIM C(21,1)
 63 DIM D(21,1)
 70 FOR F=1 TO 21
 80 LET C(F,1)=INT (RND*20)
 81 LET D(F,1)=INT (RND*30)
 82 PRINT AT C(F,1),D(F,1);"O"
 90 NEXT F
 95 LET C=A
 96 LET D=B
110 PRINT AT 21,0;"INPUT DIRECT
ION ?"
```

CO-OPERATIVE effort went into devising **Inter-Stellar Traffic** for the 16K ZX-81 by Martin Pilborough, Mark Bailie and Mark Roberts of Needham Market, Suffolk. Move your ship — graphic A — through the galaxy, docking at each of the 20 planets and avoiding the black holes. You are invisible until you have made your first move.

Move by typing the appropriate direction — N, NE, E, SE, S, SW, W, NW — and then any positive number to represent your strength. Unforeseen hazards can strike at any time. Your controls are old and over-use can cause them to break down. Approaching the edge of the galaxy can send your steering haywire. Finally, there is the ever-present threat of the dreaded inter-stellar traffic warden.



```
 120 INPUT F$
 130 PRINT AT 21,0;"INPUT STRENG
TH ?       "
 140 INPUT G
 141 PRINT AT A,B;"(isp)"
 150 IF F$="N" THEN LET A=A-G
 160 IF F$="NE" THEN LET A=A-G
 161 IF F$="NE" THEN LET B=B+G
 170 IF F$="E" THEN LET B=B+G
 175 IF F$="SE" THEN LET A=A+G
 176 IF F$="SE" THEN LET B=B+G
 180 IF F$="S" THEN LET A=A+G
 190 IF F$="SW" THEN LET A=A+G
 191 IF F$="SW" THEN LET B=B-G
 200 IF F$="W" THEN LET B=B-G
 210 IF F$="NW" THEN LET A=A-G
 211 IF F$="NW" THEN LET B=B-G
 215 PRINT AT A,B;"(9a)"
 218 IF A=M AND B=P THEN GOTO 10
00
 220 IF A=N AND B=Q THEN GOTO 10
00
 221 IF A=O AND B=R THEN GOTO 10
00
 222 IF A=C(1,1) AND B=D(1,1) OR
 A=C(2,1) AND B=D(2,1) OR A=C(3,
1) AND B=D(3,1) OR A=C(4,1) AND
B=D(4,1) THEN GOSUB 3000
 223 IF A=C(5,1) AND B=D(5,1) OR
 A=C(6,1) AND B=D(6,1) OR A=C(7,
1) AND B=D(7,1) OR A=C(8,1) AND
B=D(8,1) THEN GOSUB 3000
 224 IF A=C(9,1) AND B=D(9,1) OR
 A=C(10,1) AND B=D(10,1) OR A=C(
```

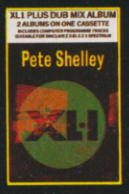
```
11,1) AND B=D(11,1) OR A=C(12,1)
 AND B=D(12,1) THEN GOSUB 3000
 225 IF A=C(13,1) AND B=D(13,1)
OR A=C(14,1) AND B=D(14,1) OR A=
C(15,1) AND B=D(15,1) OR A=C(16,
1) AND B=D(16,1) THEN GOSUB 3000
 226 IF A=C(17,1) AND B=D(17,1)
OR A=C(18,1) AND B=D(18,1) OR A=
C(19,1) AND B=D(19,1) OR A=C(20,
1) AND B=D(20,1) OR A=C(21,1) AN
D B=D(21,1) THEN GOSUB 3000
 230 GOTO 100
1000 CLS
1002 PRINT "YOUR ENGINES HAVE BE
EN CLOGGED   WITH ******(BOGIES)
"
1003 PRINT "YOU HAVE BEEN FINED
BY THE      INTER-STELLA TRAFFIC
 WARDEN"
1004 PRINT AT 17,0;"IF YOU ARE U
NABLE TO PAY THIS    FINE YOU WI
LL BE MADE TO WASH   THE DISHES
FOR M.PILBROUGH      ESQ."
1010 PRINT AT 10,10;"(9*isp)";TA
B 10;"(isp:95)FINED (isp)";TAB 1
0;"(isp:95)£9,000(isp)";TAB 10;"
(9*isp)";TAB 14;"(isp)";TAB 14;"
(isp)";TAB 14;"(isp)"
1050 STOP
3000 LET CO=CO+1
3010 IF CO=22 THEN GOTO 4000
3020 RETURN
4000 CLS
4010 PRINT "YOU HAVE FINISHED"
```

Pete Shelley

IN TUNE WITH THE TIMES

XL·1

NEW ALBUM XL1
INCLUDES 10 COMPUTER PROGRAMMES
FOR SINCLAIR ZX SPECTRUM



XL1 PLUS DUB MIX ALBUM
DOUBLE VALUE CASSETTE TWO
ALBUMS FOR THE PRICE OF ONE

GENETIC RECORDS

THE WIZARD'S WARRIORS: A fast moving game that matches developments in your skill as a player by becoming increasingly more devious. By offering to you the full range of options you can choose how to control your warrior through the maze. A full implementation of this program enables such features as a continuous series of sound effects, arcade quality graphics, double-point scoring, and--for the very artful --bonus lives. **Spectrum £4.95**

FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. **Spectrum 14.95**

ADVENTURE ONE: Features a save game routine as the game can take months to complete. 'a remarkably good version....well worth the money.' ...*Sinclair User*... **ZX81 £5.95**

MAZEMAN: A fast action m/c game that reproduces the spirit of the original. '..is very accurate and fast.' ...*Which Micro?*... **Spectrum £4.95 ZX81 £4.45**

CHESS 1.4: Ten levels of play with this m/c program. Good graphic screen display. 'In a class of it's own.' ...*Your Computer*... **ZX81 £5.95**

INVADERS: Very fast m/c action. Includes mystery ship and increasingly difficult screens. **ZX81 £4.45**

7 MAES AFALLEN, BOW ST., DYFED, SY24 5BA

24hr Ansaphone 0970 828851

Access

30 Hour BASIC
(ZX81 edition)

Britain's top selling BASIC course

Over 100,000 users

8 chapters
155 programs
30 worked examples
53 self-checks *with* answers
35 exercises *with* answers
43 figures
full index
spiral bound — opens flat
two colour text

You've got Britain's most popular computer.

Now get Britain's most popular programming course.

Amazing value at £5.95

Send for your copy/ies direct, enclosing payment, to:

The National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN

SPECTRUM COMPILER
for both 16K and 48K

Almost any BASIC program can be speeded up, by a factor of up to several hundred times. It will produce machine code which can be located at any address.

Handles nearly all BASIC commands, some of the features unique to this compiler are:

1. Noise generator (explosions, gunshots)
2. Mini sprite graphics
3. Selected screen scrolling
4. Special BEEP commands
5. Special INPUT statement and normal INPUT statement
6. Fill the screen with current attributes, and many more to numerous to mention.

All this for only £7.99 both versions

TAPE COPIER

This will copy any Spectrum tape (if you have sufficient memory) works in both 48K and 16K, only £4 inclusive.

We have a number of orginal machine code games under development, which will use the full HI RES graphics and sound facilities of the compiler. These will be coming shortly.

Send Cheque/PO payable to:

WYE VALLEY SOFTWARE
PARTON HOUSE KINNERSLEY
HEREFORDSHIRE

campbell systems

THE VERY BEST IN MACHINE CODE FOR THE **ZXSPECTRUM** & **ZX81**

All programs supplied double-recorded and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

for 48K Spectrum **MASTERFILE** business/domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts ..... applications are endless. Fully user-defined data and report display formats, dynamic variable-length file, records and data items. Fully menu-driven with powerful search facilities, sorting, total/average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22 page manual. £15.00

NEW **Masterfile-16** for 16K Spectrum owners. We have produced a subset version of MASTERFILE called MASTERFILE-16. It has most of the features of big MASTERFILE, with 7 pre-defined report formats and 6 pre-defined fields e.g. name, address, etc., and we have found a useful 4500 bytes of file space. MASTERFILE and MASTERFILE-16 are fully 'file-compatible' and will happily process each other's files, so that 16K owners who upgrade to 48K can use their old files immediately. Complete with 12-page manual, priced at £8.95.

PLEASE REMEMBER TO STATE CLEARLY WHICH VERSION OF MASTERFILE YOU REQUIRE.

for 16K Spectrum **GULPMAN** game of the '.....man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for Popular Computing Weekly. We think you will agree. £5.95

for 16K ZX81 **GULP 2** almost identical spec to GULPMAN £4.75

for 16-64K ZX81 **THE FAST ONE** is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

Campbell Systems, Dept.(SU), 15, Rous Road, Buckhurst Hill, Essex, IG9 6BL, England. Telephone: 01-504-0589

CS

ALL-SORT™ S-1

MACHINE CODE SORTING IN YOUR BASIC

ALL-SORT S-1 is an easy to use generator for the 48K Spectrum. It outputs to cassette lines of BASIC for any Spectrum. Each output includes an active line containing the machine code sort with its own call and return.

The code sorts data in BASIC arrays. It is relocatable, normally kept as a high numbered line. The sort is called by GO SUB or by use of a FN.

Options include single or multi sort; preset or controlled by programmer or by program. Four arrays may be sorted in parallel on four keys, all defined without restraint.

1,000 records each of 40 ch sort in 10 seconds.

ALL-SORT S-1 includes a comprehensive manual. A demonstration is given on the tape. Maintenance is by low cost replacement. A commercial user's licence is available.

EXTRA: A line to add and remove records at the end of arrays is now included with ALL-SORT S-1. You now have list processing in BASIC.

Get ALL-SORT S-1 from ZX software retailers.

ALAN FIRMINGER
171 Herne Hill SE 24

RRP £18 + VAT
replacement £6

HIGH STAKES BIG DOUGH

PROGRAMS WANTED

CCS

High royalties plus cash advances paid for quality programs. CCS is a leading software house for the Spectrum and is expanding its range of programs. We require:

ADVENTURE, STRATEGY & BUSINESS programs for the SPECTRUM, DRAGON, BBC, ORIC

Our extensive marketing experience and nationwide advertising will ensure that your ingenuity is rewarded.

Write to: **C.C.S. 14 LANGTON WAY, LONDON SE3 7TL**

Celia Sims is one of the few women who have become fascinated by the ZX-81. She talks to Claudia Cook about plans for non-games uses

Making a useful home help from a small black box

HAD IT NOT been for her young son, Mrs Celia Sims admits she would never have had a computer in her home. As it is, she is fast becoming hooked on the idea of computers as home helps. It was last autumn when her two sons, Clive, aged 14, and nine-year-old Martin, met the magic of a computer for the first time. They were despatched to spend the weekend at a friend's house. The friend had a computer. Mrs Sims says:

"The boys were full of it from the moment they returned. They had spent the whole weekend playing games with the computer and they begged us to buy one".

Their father, John Sims, was against the idea of taking something so alien into the house and saw it as unnecessary. Finally, his wife says, he succumbed and presented Clive and his mother with a ZX-81 for their joint Christmas present.

"It is only a 1K and we really need a RAM pack but Clive and I are hooked already. Martin just likes to play games on it but Clive is already modifying the programs he gets from books.

"I am not interested in the games. I am just not into all that hand and eye co-ordination but when I think how it could help with my sewing, my knitting, even my shopping . . ."

It must be said that Mrs Sims, 38, is no ordinary seamstress. Having operated a full-scale sewing business from her home for several years with the help of three other people, she stopped working only when the local hospital telephoned asking her to tender for making all the nurses' uniforms.

"That was the final straw really. I just could not face the thought of doing dozens and dozens of grey dresses and my business was really getting too big. Now I do it more as a paying hobby than as a business, making all kinds of things, including ecclesiastical vestments. I also give talks on sewing to women's groups and the computer would be a marvellous visual aid for those. If you are trying to explain something complicated, like patchwork, you need dozens of drawings but the computer could show it all on a screen so much more clearly".

Mrs Sims also sees potential in a computer for providing simpler, more entertaining knitting instructions. She reckons it could save hours on the calculations for a pattern or embroidery design.

At present, though, that is a dream for the future. Certainly none of it will be possible until she has a printer and probably a bigger computer. Besides, Mrs Sims is also a busy wife and mother, caught in the turmoil of moving from the family bungalow at Great Yarmouth, Norfolk to Felixstowe, Suffolk.

When asked what her women friends think of her growing interest in computers, she says she does not see why it should be any different for a woman. She pauses, then says:

"I don't tell my friends about it. I would run out of language for one thing; they would not understand the jargon. None of them has a computer at home".

So far as her home computer goes, Mrs Sims is a woman among men but it is not for the first time. "I worked as a

computer programmer before I was married, although what I did is so out-of-date now that all this is new to me. In one office there were two women and masses of men. It was so different then. We did not have screens for one thing and now I am fascinated by the graphics. The language is different, too. I was really scared of it all at first."

Having taken a six-month course in computational mathematics and computer programming after leaving school, Mrs Sims programmed computers in two jobs. The first was for a computer manufacturer and she worked at a junior level on stock control programs. Her second job, "before computers were two a penny", was for the London Boroughs Management Services Unit, where the computer was responsible for a host of tasks, including the calculation of council pay rolls, rents, rates, mortgages and registers of electors.

"Now, of course, all the councils probably have their own computers. I was told at the time that things would change very rapidly and I am only surprised that people were not ready for the silicon chip when it arrived" she says.

Equipped already with a basic knowledge of computer programming but still with much to learn about the latest techniques, Mrs Sims feels there is a great need for systems analysts, a need she feels she might well help to fill one day.

"I am a little concerned about school teachers, for example, using computers and making programs which work but are not structurally all they could be. It is not happening yet but I am sure it will. In language laboratories, for example, where a teacher qualified in French then starts writing programs but with a limited knowledge of computers".

Mrs Sims feels there is a lack of forethought in some of the programs written today, even for games. Her son Clive, she says, frequently finds programs which do not do all they should and he settles down to adapt them.

"This is the first time Clive had anything to do with computers and he has used ours every day since Christmas. If there is a problem I help him but that just means both of us going through the manual until we work it out. It is all too different for my early training to be much good.

"I have written one program but it was very simple, a version of Connect Four for the 1K, because there seemed to be one only for the 16K.

"I had to look up everything first in the manual and I suppose it took me a day to sort it all out. Then the program did not take long at all".

Mrs Sims is determined that any bigger computer she might buy must pay for itself and, to that extent, she views it as a commercial proposition. She feels strongly, however, that computers should not be seen simply as for commercial application. They should be used, too, as visual aids, and as potential assistance in the home.

"I would like to encourage women to try. Many still take the attitude that nothing beats a pencil and paper but if I had a printer I would certainly use the computer for my shopping list.

"I go shopping only once a month and I have a list of what I have left in my kitchen rather than what I need to buy. Then I replace what has gone, as well as keeping my eye open for bargains. I have a kind of built-in recorder list in my head which it would be much better to have on the computer".

Mrs Sims feels that few women will go and buy themselves a home computer but once their children take one into the home, they should not ignore it.

"I know people who have a very complicated sewing machine capable of all kinds of things and yet they use it only for simple sewing. Somehow they think it does simple sewing better. To me that is a waste. If you have a machine like that in the house, why not explore its potential? The same with a computer".

'I would like to encourage women to try. Many still think that nothing beats a pencil and paper but if I had a printer I would use the computer for my shopping list'

Mrs Sims fully expects to see the time when far fewer people need to leave their homes to go to work — when, with comprehensive programs available, many more parents might consider teaching their children at home, with the help of a computer.

She acknowledges that school is a great help to many children for its social contacts, if nothing else, but she praises the ZX-81 for the change it has already effected in her own son.

"He has always been very quiet, a loner really, and he has never seemed particularly interested in any one thing, but since Christmas he is a changed person. He talks non-stop about computer programs and how he will modify them. He really seems to have a feeling for it.

"He enjoys the games, as does Martin, but he is more interested in the whole idea of programming and he has learned a great deal about it very quickly".

It looks as if, between them, Mrs Sims and her sons will soon master the complexities of computers but she sees nothing unusual in that.

"I admit I was scared by the language at first until I discovered that you just have to bludgeon people. Once you know that interface simply means a link, you begin to realise it is all simple, really.

"Even the language of physics and electronics deters many women but it need not. Women can master computers as well as any man".

spectrum

NEWS from SPECTRUM

Sensational TEXAS OFFER!

Fantastic reductions & offers on the TEXAS TI-99/4A see our ad. on next double page for details.

PRESTEL

See PRESTEL Page 600181 for up to date information from SPECTRUM

NEW SPECTRUM MEMBERS

Check our address page! - there are many new **SPECTRUM** dealers throughout the UK so there's a good chance there'll be a **SPECTRUM** centre near you.

VIC-20 Package Offer!

A sensational package offer on this top selling micro. A complete computer system for only £139.99 - see our advertisement for full details.

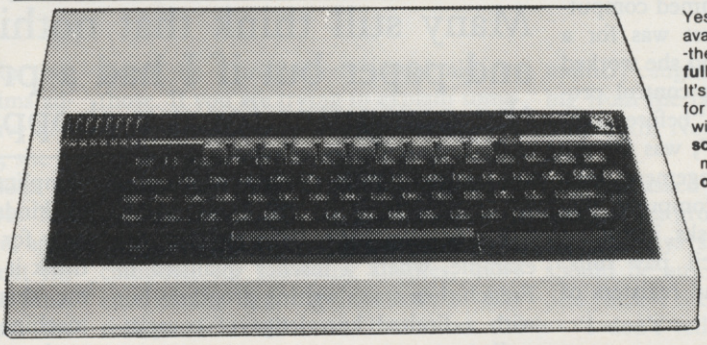
AFTER SALES CARE

SPECTRUM service centres will ensure that should your machine 'go down' **we will get it running again as quickly as possible.** We also offer **extended warranties** at reasonable prices too! - ask your **SPECTRUM HOME COMPUTER CENTRE** for full details.

COMPUTER DEALERS

The **SPECTRUM** dealer list is virtually closed. If your area is free and you'd like to join the waiting list, please write to **MIKE STERN, Spectrum (U.K.) Ltd, Burrowfields, Welwyn Garden City, Herts.**

BBC Model 'B' MICRO



Yes, this **top selling Micro system** is now available from your local **SPECTRUM** dealer -the **BBC Model'B'** offering **32K RAM** plus a **full back-up** of **peripherals & software** too! It's an **infinitely expandable** machine, ideal for the **home or business** and is already widely used for **educational purposes in schools** -so the chances are **your** children may already be **well familiar with its operation,** which must make it the **ideal choice** for the **home** too! So if you're thinking of buying a micro you **must** take a look at the **BBC** at your local **SPECTRUM** dealer **NOW!** - but just one word of warning, initially stocks will be limited and **demand is bound to be great,** so please 'phone to check the stock position before making a journey.

BBC 'B' with Disk Interface
£470.50

BBC Disk Interface Kit
£95.00

BBC Single Disk Drive 100K
£265.00

BBC Dual Disk Drive 800K
£803.85

BBC Tape Recorder
£29.90

BBC Acorn Software Cassette based from
£9.95

BBC Disk based software
£11.50

Spectrum Price

£399.00 INC. VAT

Please Note!

We regret that there is a tremendous shortage on all BBC equipment — please phone your nearest store before making a journey to check stock position.

SHARP MZ-80A

Desk top genius! the all-in-one SHARP MZ-80A. Ready to run the moment you get it home. Built-in keyboard. CRT. 9" display and cassette data storage with **48K RAM.** The BASIC with extra useful additions, offers quite a powerful micro for the home or business. ■ 4K Byte ROM 48K Byte RAM · 2K Byte Video RAM ■ ASCII profiled keyboard · numeric pad ■ 2page Video RAM allows screen to be scrolled up or down. ■ CP/M available.

Spectrum Price **£546.25** Inc. VAT

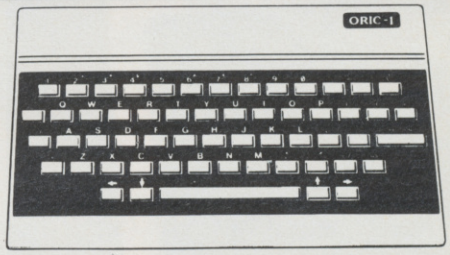
Floppy Disks and Accessories for MZ80A

Twin Floppy Disk unit (inc. 1/0 Card, Disk, Cable).....**£856.75**
Twin Disk Unit (only).....**£678.50**
Single Floppy Disk Unit..**£460.00**
Cable for F/D Drive.....**£29.79**

Printers and Accessories for MZ80A, MZ80B & MZ80K

80 Col Tractor Feed Printer inc. Cable. 1/0 Card & Rom **£477.25**

ORIC-1



A superbly designed and engineered micro and great value-for-money from **SPECTRUM.** Offering **48K RAM Colour** - (8 foreground and 8 background can be displayed at same time) **High resolution graphics User definable Graphics. Full sound** (6 octaves of controllable sound) **Easy to use keyboard with moving keys. Standard Centronics parallel interface allows** easy connection to a wide range of printers etc

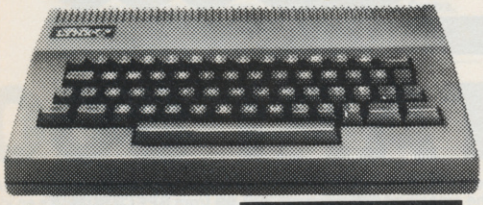
Spectrum Price **£169.95** Inc. VAT

SPECTRUM FACTS

Maximum user RAM	47,870 Bytes
Text screen	28x40
High Resolution	240x200
Cassette Lead	Included

Not all stores carry every advertised item, please phone before making a journey — Prices correct at time of going to press E. & O.E.

The powerful and infinitely expandable LYNX



Just look at this **super new LYNX Micro - an incredible** 16K & 32K video ram and that's expandable up to or beyond 96K. For just **£225.00 INC VAT** the **LYNX is exceptionally versatile.** All **LYNX's** 'add-on' connections are **standard types.** The high definition **colour graphics** make it a **top value choice** for the **home or office** (with expansion, the **LYNX** can become an 80 characters-per-line word processor!) Take a look at the **LYNX** - a memorable bargain from **SPECTRUM.** But please phone to check stock position before making a journey as this machine is bound to be in **great demand.**

Spectrum Price

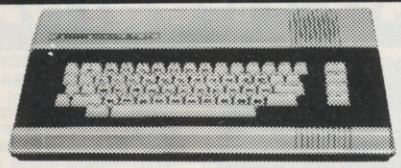
£225.00 Inc. VAT

VISCOUNT - Teach yourself LYNX BASIC **£6.95**

SPECTRUM FACTS

Maximum user RAM	13,700 Bytes (approx)
Text Screen	24 x 30
High Resolution	265 x 248
Cassette Lead	Included

COLOUR GENIE



A truly reliable micro and highly recommended by **SPECTRUM** featuring powerful and sophisticated COLOUR GRAPHICS, allowing you to create full 8-colour Games, Diagrams and charts quickly and simply. Powerful 16KK RAM memory (expandable internally to 32K) for FULL COLOUR video games and POWERFUL COMPUTING with a full range of inexpensive accessories: 16K RAM pack, Joysticks for TV games, Light Pen, Disk Drive and a Printer. The superb Colour Genie is at SPECTRUM now - check it out and see the Genius at work!

NEW Low Price £194.00 Inc. VAT

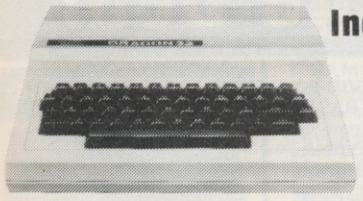
COLOUR GENIE ACCESSORIES

Joysticks	£49.49
16K RAM	£38.50
Printer Interface	£39.95
VISCOUNT Teach yourself Colour Genie Basic	£6.95

SPECTRUM FACTS

Maximum user RAM	**14,200 Bytes (approx)**
Text screen	**24x40**
High Resolution	**320 x 192**
Cassette Lead	**Included**

DRAGON



Incredible Value-for-Money!

Extensive facilities include highly advanced colour graphics. Powerful standard 32K RAM (expandable to 64K Bytes). ● 9 Colour 5 resolution Display ● Extended Microsoft colour BASIC (as standard) ● Advanced sound with 5 octaves -255 tones

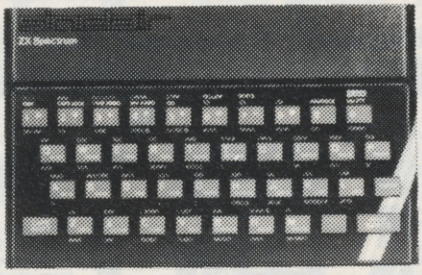
SPECTRUM FACTS

Maximum user RAM	29,679 Bytes
Text Scrn	16 x 32
High Resolution	256 x 192
Cassette Lead	Included

VISCOUNT Teach yourself Dragon Basic **£6.95**

Spectrum Price only £175.00 INC. VAT

SINCLAIR ZX SPECTRUM



Yes, this top selling micro is now available from Spectrum in both **16K** and **48K RAM.** So now there's no need to send by Mail Order - just call into your local SPECTRUM dealer and pick one up. But just one word of warning: with this added avilability advantage, stocks are bound to sell fast - so make it soon!

SINCLAIR ZX SPECTRUM 16K - £99.95
SINCLAIR ZX SPECTRUM 48K - £129.95

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

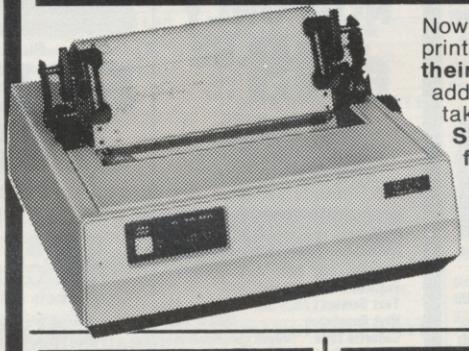
SINCLAIR ZX-81

SINCLAIR ZX . . . £49.95
16K RAM pack . . £29.95
ZX Printer . . . £39.95

Computer Bookshop Software for Sinclair Computers	**INC. VAT**
Bumper 7 1K ZX81	£5.95
1K Super Trio ZX81	£7.95
Labyrinth 16K ZX81	£5.95
Nightmare Park/Music 16K ZX81	£6.95
Computacalc 16K ZX81	£7.95
Personal Banking System 16K ZX81	£11.44
Space Invaders/Rescue 16K ZX81	£6.95
Breakout 16K ZX81	£5.95
Mugsy 16K ZX81	£5.95
Mergatroyds 16K ZX81	£5.95
Progmerge 16K ZX81	£5.95
Football Manager 16K ZX81	£7.95
Cassettes for ZX81 Type—10	
6 Games	£3.95
Junior Education	£3.95
Business & Household	£3.95
Skill & Judgement Games	£3.95
Junior Education	£3.95
Family Quiz	£3.95
Type—20	
Fantasy Games	£4.75
Space Raiders & Bombers	£4.75
Type—30	
Super Programs Nos. 1-8	£4.95
Type—40	
Backgammon	£5.95
Flight Simulation	£5.95
Type—50	
English Literature 1	£6.95
English Literature 2	£6.95
Geography	£6.95
History 1	£6.95
Maths. 1	£6.95

ZX-PANDA
16K RAM PACK
ONLY £24.95

OKI MICROLINE Printers

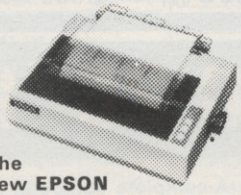


Now from **SPECTRUM** - this **top selling** range of printers **renowned throughout the world for their quality and reliability.** If you're thinking of adding a printer to your micro then you must take a look at the **MICROLINE** range at **SPECTRUM -NOW!** they're **fantastic value-for-money**

Models available

MICROLINE Model 80 £259.90
MICROLINE Model 82A £455.40
MICROLINE Model 92P £585.35

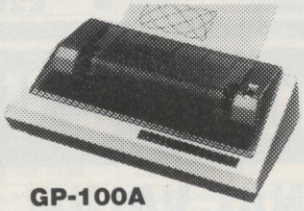
EPSON



The new **EPSON RX-80** and **FX** printers now available—check with your local **SPECTRUM** dealer **NOW!**

FX-80 Spectrum Price **£503.70**
RX-80 Spectrum Price **£332.35**

SEIKOSHA



GP-100A

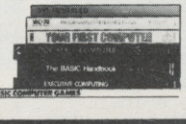
Now a top quality graphic printer at a price you can afford. Centronics interface connects easily with most micros.
Spectrum price **£229.94** Inc. VAT Cables & Interfaces available for most micros

SMITH CORONA

Model TP-1

Microprocessor controlled, high quality daisy wheel printer at a LOW cost from SPECTRUM. Serial, Parallel or IEEE Interface.
Spectrum LOW price **£557.75** Inc. VAT

BOOKS



SELECTION FROM THE COMPUTER BOOKSHOP

30 Hour Basic for the BBC Micro	£5.95
Let your BBC Micro Teach You to programme	£6.45
BBC Micro Revealed	£7.95
Over the Spectrum	£6.95
60 Games and Applications for the ZX Spectrum	£4.95
Programming the 6502	£9.95
Programming your ZX Spectrum	£6.95
ZAP Pow Boom for the Vic 20	£7.95
The ZX Spectrum Explored	£5.95
Vic Inovative Computing	£6.95
Mastering Machine Code on your Zx81	£7.50
The ZX Spectrum and how to get the most from it	£5.95
Easy Programming for the ZX Spectrum	£5.95
30 Programmes for the BBC Micro	£4.95
CPM Handbook	£11.50
Programming the Z80	£11.95
20 Best Programmes for the ZX Spectrum	£5.95
Getting aquainted with your Vic 20	£6.95
Machine code and Better Basic	£7.50
The Cambridge Colour Collection (Spectrum)	£6.95
Vic Revealed	£10.00
De RE Atari	£17.00
ATARI Operating system listing	£10.43

MORE SPECTRUM LOW PRICES

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

spectrum

A few examples from our

SOFTWARE Selection

from independent software houses

THORN EMI

Software for ATARI	Inc. VAT
Submarine Commander	£34.44
Jumbo Jet Pilot	£34.44
Soccer	£29.84
Kickback	£29.84
Home Financial Management	£19.49
Darts	£19.49
Snooker & Billiards	£19.49
Pool	£19.49
Cribbage & Dominoes	£19.49
Cupute 4 & Reversi	£14.89
Mutant Herd	£24.25
Software for Commodore	
River Rescue	£25.24
Vic Music Composer	£25.24

GEM

Software for ZX81, Dragon and Spectrum	Inc. VAT
Monster Mine (for ZX81)	£4.95
Monster Mine (for Spectrum)	4.95
Monster Mine (for Dragon)	7.95
Space Mission (for ZX81)	£4.95
Space Mission (for Spectrum)	£4.95
Space Mission (for Dragon)	£7.95
Dragon Golf	£7.95
Dragon Character Generator	£9.95

SALAMANDER

Games for Dragon 32	Inc. VAT
Dragon Trek	£9.95
Wizard War	£7.95
Vulcan 0	£7.95
Games Compendium DI	£7.95
Golf	£7.95

RABBIT

Software for Commodore VIC20	Inc. VAT
Space Storm	£6.99
Ski Run	£4.99

Dune Buggy	£4.99
Super Worm	£4.99
Jungle	£4.99
Cosmic Battle	£4.99
Frogger(3K)	£4.99
Rabbit Functions	£4.99
Code Breaker	£4.99
Night Fight (3K)	£4.99
Rabbit Writer (16K Cassette)	£19.99
Rabbit Base (16K Cassette)	£14.99
Myriad (3K)	£9.99
Charset/20 (3K)	£4.99
Skramble	£9.99
Space Phreeks	£9.99
Night Crawler	£9.49
Hopper	£9.99
Tank War	£7.99

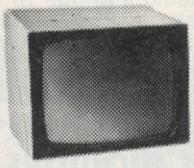
KUMA

Software for Sharp	
Electron 22622	£9.20
Cribbage	£12.08
Adventure	£12.08
Chess	£16.68

AUDIOGENIC

Programs for VIC-20	Inc.VAT
Amok	£6.95
Alien Blitz	£7.95
Golf	£7.95
Spiders of Mars	£19.95
Sattelite & Meteorites	£19.95
Bonzo	£7.95
Trashman	£19.95
Boss	£14.95
Tank Attack	£19.95
Word Craft	
Word Processing package	£125.00

Plus many more at your local SPECTRUM dealer -call in now and see!



ACCESSORIES

SANYO Colour Monitor CDD3125NB

£286.35

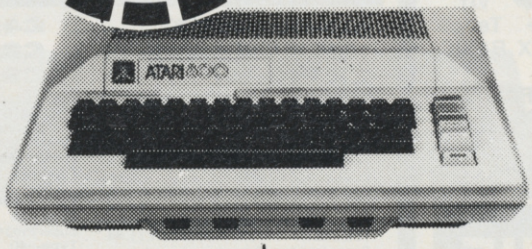
SANYO	Inc. VAT
SANYO 12" green monitor	£113.85
Slim 3G Cassette Recorder	£29.95
C12 Cassettes	£0.50
Single sided double density disks (Box of 10)	£21.25
Double sided, double density disks (Box of 10)	£33.81
Disk head cleaner	£16.10

Single part 11" x9½" printer paper, box of 2,000 sheets	£13.05
VIC Accessories from Viscount	
Motherboard without Buffer	£24.95
Motherboard with Buffer	£29.90
16K RAM Pack	£43.95
32K RAM Pack	£66.95
64K RAM Pack	£114.94
Adman Chatterbox	
Voice Synthesiser	£57.45

Fantastic! NEW LOW Price

ATARI 800

Now this proven and tested machine has been upgraded to a massive **48K RAM** and its still at the amazing **LOW** price of **£399.99** from **SPECTRUM.** It's an ideal Home Micro for graphics, educational and personal finance etc. use it and it will take you from learning up to a small business use. You can add printers, program recorders, disk drives and more, to expand your micro as and when you want, to suit your needs. So if you're looking for a top of the line micro you must see the **ATARI 800** with **48K** at **SPECTRUM - NOW!**



Sensational Price

£299.95 INC. V.A.T.

SPECTRUM FACTS

Maximum user RAM	37,899 Bytes
Text Screen	24 × 40
High Resolution	320 × 192
Cassette Lead	Needs own Recorder

ATARI 400

16K RAM

NOW ONLY £149.95 INC. VAT

including FREE Programming Kit

BASIC cartridge extra

£39.99 inc. VAT

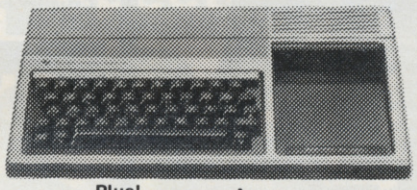
(£34.77 ex. VAT)

SPECTRUM FACTS

Maximum user RAM (with basic Cartridge)	13,323 Bytes
Text Screen	24 × 40
High Resolution	320 × 192
Cassette Lead	Needs own Recorder

ATARI DISK DRIVE £299.00 INC. VAT

TEXAS TI-99/4A



Yes, now from **SPECTRUM** the **fabulous TEXAS TI 99/4A** Home Micro at a **super NEW LOW PRICE - PLUS!** A SUPER **FREE!** offer too! Worth **£50.85** (which means you're effectively **only paying £99.10** for your **TEXAS TI99/4A micro**). **Hurry!** Offer closes June 30th.

Plus!

FREE!

■ SPEECH SYNTHESISER or a ■ TI CASSETTE RECORDER each worth

£49.95

When you buy any 6 Texas Software modules.

Ask your local **SPECTRUM** dealer for details

SENSATIONAL VALUE!

£149.95

including

FREE!

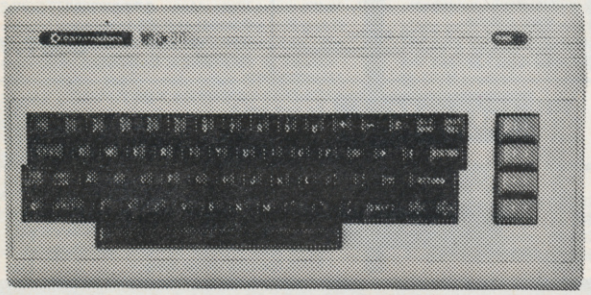
■ Pair of Joysticks ■ Beginners BASIC Tutor program ■ Connect Four program

worth **£50.85**

Ask your local SPECTRUM Dealer for details

Commodore VIC-20 'Package Deal'

SENSATIONAL VALUE!

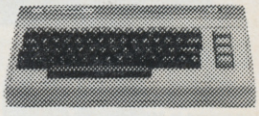


A **complete computer system** including the **VIC-20 Computer,** a **Cassette Unit, Introduction to BASIC part 1** - a simple explanation of computer programming. **A tape of four computer programs - Blitz, Type-A-Tune, Race & Hoppit. A fantastic deal!** and **great value-for-money** - check it out at your local **SPECTRUM** dealer **NOW!! But Hurry!** this is a **limited offer** only **while stocks last!**

SPECTRUM PRICE ONLY

£139.99

COMMODORE 64



Powerful 64K RAM

40-colour displays to monitor TV. High resolution graphics and 3-dimensional effect capability, music synthesiser. Z80 additional processor option.

Spectrum Price

£345.00 INC. VAT

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

There's a Spectrum Centre near you . . .

ABERYSTWYTH
AberData at Galloways, 23 Pier St. 0970 615522

ABINGDON
Ivor Fields Computers, 21 Stert St. 0235 21207

ACCRINGTON
PV Computers, 38A Water St. 0254 36521/32611

ALDERSHOT
David Saunders Computer Centre, 51 Station Rd. 0252 20130

ALFRETON
Gordon Harwood, 69/71 High St. 0773 832078

BANBURY
Computer Plus, 2 Church Lane. (0295) 55890

BARROW-IN-FURNESS
Barrow Computer Centre, 96 Church St. 0229 38353

BASILDON
Godfrey's, 28-32 East Walk, Town Centre. 0268 289379

BASINGSTOKE
Fisher's, 2/3 Market Place. 0256 22079

BATH
Software Plus, 12 York St. 0225 61676

BEDFORD
Stanad Ltd., 115 Midland Rd. 0234 49341

BELFAST
Arthur Hobson Ltd., 37 Great Victoria St. 0232 246336

BIRMINGHAM
Sherwoods, Great Western Arcade. 021 236 7211

BOSTON
Fotosound Computers, 19 Dolphin Lane. 0205 64781

BRADFORD
Erricks Foto-Sonic House, Rawson Square 0274 309266

BRIGHTON
Capricorn, 1 Queens Rd. 0273 29634

BRISTOL
Brensal Computers Ltd., 24 Park Row, 0272 294188

BURNLEY
IMO Computer Centre, 39-43 Standish St., BB11 1AP 0282 54299

BURY (Lancs.)
Micro-North, 7 Broad St. Tel. 061-797 5764

BURY ST. EDMUNDS
Bury Computer Centre, Tel. 061-797 9764

CAMBERLEY
Camera Arts (Micro Computer Division), 36 High St. (0276) 65848

CAMBRIDGE
KP Ltd., 12a Kings Parade. 0223 68087

CANTERBURY
Kent Micro Systems, Conquest House, 17 Palace St. 0227 50200

CARDIFF
Randall Cox, 18-22 High St. Arcade. 0222 31960

CHELMSFORD
Maxton Hayman Ltd., 5 Broomfield Rd. (0245) 354595

CHERTSEY
Chertsey Computer Centre, 1, Windsor Street. 09328 64663

CHESHAM
Reed Photography & Computers, 113 High St. 0494 783373

CHESTER
Oakleaf Computers Ltd. 100 Boughton. 0244 310099

COVENTRY
Coventry Micro Centre, 33 Far Gosford St. (0203) 58942

CREWE
Microman, Unit 2, 128 Nantwich Rd. 0270 216014

CROYDON
Cadcom Ltd, 96 Whitgift Centre (Next door to MacDonald's) 01-686 8393

DARLINGTON
McKenna & Brown, 102 Bondgate. (0325) 59744

DERBY
C T Electronics, at Camera Thorpe, The Spot. 0332 360456

DUMFRIES
Vennals, 71 English St. 0387 4547

DUNSTABLE
Dormans, 7-11 Broad Walk. 0582 65515

EDGWARE
Breaker 1-4, 130 High Street, 01-952 7488/8860

EDINBURGH
The Silicon Centre, 6-7 Antigua St. 031 557 4546

EVESHAM
Tecnicare, The Lodge, Brickiln St., 0386 41484

EXMOUTH
Open Channel, 30 The Strand, 03952 4408

GLASGOW
Victor Morris Ltd., 340 Argyle St. 041 221 8958

GLOUCESTER
The Model Shop, 79-81 Northgate St. (0452) 410693

GRANTHAM
Oakleaf Computers Ltd. 121 Dudley Rd.0476-76994/70281

GRIMSBY
R. C. Johnson Ltd., 22 Friargate, Riverhead Centre. 0472 42031

GUERNSEY
Grut's, 3-5 The Pollet, St Peters Port. 0481 24682

GUILDFORD
The Model Shop, 23 Swan Lane. (00772) 0483 39115

HAMILTON
Tom Dickson Computers, 8-12 Cadzow St. 0698 283193

HARROW
Camera Arts (Micro Computer Division), 24 St. Ann's Rd. 01-427 5469

HATFIELD
Microworld, 2 Crawford Rd. (07072) 64137

HEMEL HEMSTEAD
Faxminster Ltd, Computer & Electrical Discount Centre, 25 Market Square. 0442 55044

HEREFORD
Melgray Hi-Tech Ltd, 49 Broad St. 0432 275737

HESWALL
Thornguard Computer Systems 46 Pensby Rd. 051-342 7516

HITCHIN
Camera Arts (Micro Computer Division), 68A Hermitage Rd. 0462 59285

HULL
The Computer Centre (Humberside) Ltd., 26 Anlaby Road (0482) 26297

ILFORD
Prot Enterprises, 1 Centreway, (next to Sainsburys) High Rd. 01-553 0144

IPSWICH
Brainwave, 24 Crown St. 0473 50965

ISLE OF MAN
T. H. Colebourn Ltd., 57-61 Victoria St., Douglas. 0624 3482 (Just Opening)

JERSEY
Audio & Computer Centre 7 Peter St., St. Helier. 0534 74000

KILMARNOCK
Vennals, 49 Foregate 0568 32175

KIRCALDY
R. Kilpatrick, 254E High St. Tel. T.b.a.

LEAMINGTON SPA
IC Computers, 43 Russell St. 0926 36244 (Opening Soon)

LEEDS
Bass & Bligh, 4 Lower Briggate. 0532 454451

LEICESTER
Youngs, 40-42 Belvoir St. 0533 544774

LEIGHTON BUZZARD
The Computer Centre at Milton Keynes Music, 17 Bridge St. 0525 382504/376622

LINCOLN
MKD Computers, 24 Newland Street. 0522 25907

LITTLEHAMPTON
Alan Chase Ltd., 39 High St. 09064 5674/4545

LIVERPOOL
Beaver Radio, 20-22 Whitechapple. 051-709 9898

LONDONDERRY
Foyle Computer Systems 3 Bishop St. 0504-68337

LIVERPOOL (Aintree)
Hargreaves, 31/37 Warbreck Moor. 051-525 1782

LONDON E8
McGowans, 244 Graham Rd. Hackney. 01-533 0935

LONDON EC2
Devron Computer Centre, 155 Moorgate. 01-638 3339/1830

LONDON SE1
Vic Odden's, 6 London Bdg. Walk 01-403 1988

LONDON SE9
Square Deal, 375 Footscray Rd., New Eltham. 01-859 1516

LONDON SE15
Castlehurst Ltd., 152 Rye Lane, Peckham. 01-639 2205

LONDON SW6
Chelsea Micros Ltd., 14 Jerden Place. 01-385 8494

LONDON N1
ASP Micro Systems, 185 Upper St., Islington. 01-359 9095

LONDON N14
Youngs Electronic t/a Fieldmaster, 19 The Broadway, The Bourne, Southgate 01-882 5579

LONDON N.20
Castlehurst Ltd., 1291 High Rd. 01-446 2280

LONDON NW9
Moviescope, 459 Kingsbury Rd., London NW9. 01-204 6352

LONDON W1
Devron, 4 Edgware Road. 01-724 2373

LONDON W1
Computers of Wigmore Street, 87 Wigmore St. 01-486 0373

LONDON W1
Sonic Foto & Micro Center, 256 Tottenham Court Rd. 01-580 5826

LONDON W3
Colormatic Computers, 44 High St., Acton. 01-992 7611

LONDON W11
Electroleisure, 120 Notting Hill Gate. 01-221 7029

LOUGHTON
Micro & Movie Channel 309 High Rd. 01-508 1216

LOWESTOFT
John Wells, 44 London Rd. North. 0502 3742

LUTON
Terry-More, 49 George St., 0582 23391/2

MACCLESFIELD
Camera & Computer Centre, 118 Mill St. 0625 27468

MANCHESTER
Lomax Ltd., 8 Exchange St., St. Ann's Sq. 061 832 6167

MANCHESTER GTR.
Mr. Micro Ltd., 69 Partington Lane, Swinton. 061 7282282 open Thurs.-Fri.-Sat. till 8 p.m.

MANCHESTER GTR.
PASE, 213-215 Market St., Hyde. 061-366 5935 Telex: 665845

MANCHESTER GTR.
Wilding Ltd., 23 Deansgate, Bolton. 0204 33512

MANCHESTER GTR. Eccles
Home & Business Computers 4 Northway, Eccles Precinct. 061-707 2004

MARKET HARBOROUGH
Harborough Home Computers, 7 Church Street. 0858 63056

MIDDLESBROUGH
McKenna & Brown, 190 Linthorpe Rd. 0642 248345

NEWCASTLE-ON-TYNE
Newcastle Camera & Computer Mart, 16 Northumberland Ct. 0632 327461

NEW MALDEN
Surrey Micro Systems, 31 High St. 01-942 0478

NEWPORT (Gwent)
Randall Cox, 118 Commercial St. 0633 67378

NORTHAMPTON
Basic Computers & Systems Ltd., 72 Kingsthorpe Hollow. 0604 710740

NORTHWICH
Camera & Computer Centre, 3 Town Sq. (0606) 45629

NORWICH
Sound Marketing, 52 St Benedicts St. 0603 667725

NOTTINGHAM
Cameo Computers, 8/9/10 Trinity Walk. 0602 42912

NOTTINGHAM
Basic 39-41 Trent Boulevard, West Bridgeford 0602 819713

OLDHAM
Home & Business Computers Ltd., 54 Yorkshire St., 061-633 1608

OXFORD
Ivor Fields, 7 St Ebbes Street. 0235 21207

PAIGNTON
Devon Computers, 81 Upper Manor Rd. (0803) 526303

PEMBROKE
Randall Cox, 19 Main St., 064 668 2876

PETERBOROUGH
Peterborough Communications 91 Midland Rd. 0733 41007

PETERHEAD
North East Computers 1-3 Ellis St. 0779 79900

PORTSMOUTH
Computer Corner, 261 Commercial Rd. 0705 833938

PORTSMOUTH Waterlooville
GB Microland, 7 Queens Prde 07014 59911

PORT TALBOT
Micro Gen, 6 Royal Buildings, Talbot Road, 0639 887730

POTTERS BAR
The Computer Shop, 197 High Street. 0707 44417

PRESTON
Wilding's, 49 Fishergate. 0772 556250

RAINHAM
Microway Computers, 39 High Street. 0634 376702

READING
David Saunders Computer Centre, 8 Yield Hall Plce. 0734 580719

ROCHDALE
Home & Business Computers 75 Yorkshire St. Tel. T.b.a.

ROTHERHAM
Kenneth Whitehead, 2 Market St. 0709 62594

RUGBY
The Rugby Micro Centre, 9-11 Regent St. 0788 70522

SEVENOAKS
Ernest Fielder Computers, Dorset St. 0732 456800

SHEFFIELD
Superior Systems Ltd., 178 West St. 0742 755005

SHREWSBURY
Computerama, 13 Castle Gate Tel: TBA (Opening soon)

SKIPTON
Look & See, 45 Belmont Bridge. 0756 60078

SOUTHAMPTON
R. J. Parker & Son Ltd., 11 Portsmouth Rd., Woolston, Southampton. 0703 434137/8

SOUTHPORT
Central Computers, 575 Lord St. 0704 31881

STAFFORD
Computerama, 59 Forgate St. (0785) 41899

STEVENAGE
D. J. Computers 11 Town Sq. 0438 65501

STIRLING
R. Kilpatrick, 58 Port St. 0786 5532

STOCKPORT
Wilding Ltd., 1 Little Underbank, Stockport. 061-480 3435

STOKE-ON-TRENT
Computerama, 11 Market Sq. Arcade, Hanley. 0782 268620

ST. ALBANS (Herts)
Clarks Computer Centre, 14-16 Holywell Hill. 0727 52991

ST. AUSTELL
A B & C Computers, Duchy House, 6 Lower Aylmer Sq. 0726 64463

TAUNTON
Grays, 1 St James St. 0823 72986

TEDDINGTON
Teddington Camera Centre, Broad St. 01-977 4716

THETFORD
Thetford C B & Micros, 21 Guildhall Street. 0842 61645

WALLINGTON
Surrey Micro Systems Ltd., 53 Woodcote Rd. 01-647 5636

WARRINGTON
Wildings, 111 Bridge St. 0925 38290

WATFORD
SRS Microsystems Ltd., 94 The Parade, High St. 0923 26602

WEST BROMWICH
Bell & Jones, 39 Queens Sq. 021 553 0820

WESTON-SUPER-MARE
K. & K. Computers, 32 Alfred St. Tel. TBA

WHITEHAVEN
P. D. Hendren, 15 King St. 0946 2063

WIDNES
Computer City, 78 Victoria Rd. 051 420 3333

WIGAN
Wilding Ltd., 11 Mesnes St. 0942 44382

WILMSLOW
Swift of Wilmslow, 4-6 St. Annes Parade. 0625 526213

WOKING
Harpers, 71-73 Commercial Way. 04862 61061

WORCESTER
David Waring Ltd., 1 Marmion House, High St. 0905 27551

WREXHAM
T E Roberts, 26 King Street 0978 364404/364527

GT. YARMOUTH
Tony Hood Electronic, 26a Market Gate Shopping Centre 0493 3143

YORK
York Computer Centre, 7 Stonegate Arcade. 0904 641862

Not all stores carry every advertised item, please phone before making a journey — Prices correct at time of going to press E. & O.E.

Overtures out of the Spectrum BEEP

This extract by Ian McLean is from the *ZX-Spectrum — Your Personal Computer*

SPECTRUM SOUND is very simple to use. There is only one instruction, BEEP, which has two parameters. The first determines the length in seconds the sound lasts. The second determines how high or low the pitch of the sound. The first number must be positive and the second may be anywhere within the range −60 to +69. The higher or more positive the pitch parameter, the higher — more squeaky — the sound will be.

Those who are not familiar with musical notation, however, may be deterred by the task of converting sheet music to Spectrum commands.

Rule one is to stay with simple tunes and tunes you know.

The Spectrum is not a symphony orchestra. It sounds best when playing tunes with a simple, catchy and easily-remembered melody.

Even simple tunes can look daunting on sheet music. For a start, there are usually two sets of five lines joined together, as in figure one.

You will see that the top set of lines starts with the symbol 𝄞, while the bottom line starts with the symbol 𝄢.

𝄞 is the treble clef;
𝄢 is the bass clef.

Rule two is to ignore the lines starting with the bass clef. Thus the music is simplified to figure two.

Your problems are not yet over. As you probably know the symbols of the form ♩ stand for musical notes. You will see, however, that most of the notes in this tune are of the form 𝅘𝅥𝅯.

Much of the sheet music you see will have this kind of multiple note. That is because the tunes are written so that they can be sung in harmony.

Rule three is that when dealing with harmony, ignore all except the top notes. Thus the music is further simplified to figure three.

Now I will have to cover a little musical theory. Look at the five lines. Again you may know that notes written near the top five lines are of a higher pitch than those written near the bottom. For convenience, notes are given names which determine their pitch. Those names consist of the letters A to G. Thus the position of a note on the lines can be represented by a letter, as in figure four.

You will probably have heard of the musical scale
doh, re, me, fah, soh, la, te, doh.
The eight notes of the scale are called an

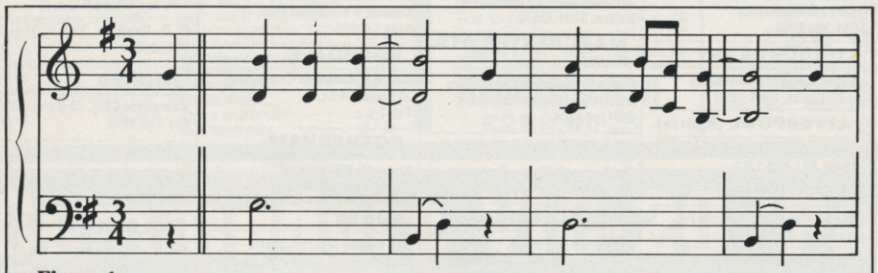


Figure 1.

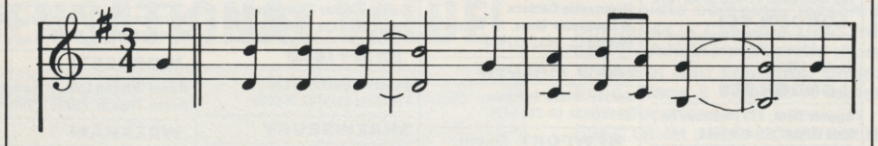


Figure 2.

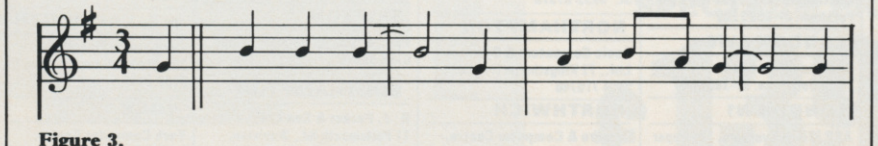


Figure 3.

octave. The scale of C is the octave which starts and ends with C. That is:
C=doh, D=re, E=me, F=fah,
G=soh, A=la, B=te, C=doh.

Similarly, the scale of A starts and ends with the note A. There is, however, a complication. Not all the steps in frequency — changes in pitch — between the notes are the same. For example, the change in pitch between the notes B and C is only half of the change in pitch between C and A. To allow for that a scale or octave is split into 12 semitones:

A
A♯ or B♭
B
C
C♯ or D♭
D
D♯ or E♭
E
F
F♯ or G♭
G
G♯ or A♭

The symbol ♯ means 'sharp' and ♭ means 'flat'. So G♯ is a semitone higher than G and A♭ is a semitone lower than A. G♯ is the same note as A♭.

I shall not deal with scales in detail; suffice it to say that the scale which sounds correct to most of us is the major scale. That goes up in semitone steps:
doh (2 steps) re (2 steps) me (1 step)
fah (2 steps) soh (2 steps) la (2 steps)
te (1 step) doh

So that the scale of C Major is C, D, E, F, G, A, B, C; and the scale of G Major is G, A, B, C, D, E, F♯, G.

When you know what semitones are and what an octave is you can make sense of the second pitch parameter in the BEEP instruction. That parameter defines the pitch in semitones above and below the note Middle C. If you want to know what Middle C sounds like, enter the command BEEP 1,0 on

your Spectrum. You will probably have appreciated by now that adding 12 to the pitch parameter raises the note by 12 semitones or one octave. So BEEP 1,12 will give the note C one octave higher than Middle C. So we can define notes using BEEP parameters.

Note	Parameter
A	−3
A♯	−2
B	−1
C	0
C♯	1
D	2
D♯	3
E	4
F	5
F♯	6
G	7
G♯	8

Reverting to musical notation, and taking a few lines below and above the five-line stave to give the normal range for most tunes, results in figure five. Note that you will have to adjust the numbers for sharps and flats — add 1 for sharp, subtract 1 for flat — written at the start of each line.

In some tunes you will find sharp and flat symbols written in the middle of the line. You will also find the symbol ♮ which converts a note to its natural value if it is normally sharp or flat. Symbols in the middle of the stave are called accidentals and affect any notes on the line or space on which they occur until the next vertical line — that is until the end of the bar in which they appear.

Rule four is to avoid tunes with a number of accidentals. Having looked at the pitch of the note, we will consider its duration. It is normal to define a single beat note as ♩ — this is called a crotchet. A half-beat note is ♪ — a quaver. A quarter-beat note is 𝅘𝅥𝅯 — a semiquaver.

Sometimes the tails of the notes are joined, i.e.

♫ is two half-beat notes.

♫ is two quarter-beat notes.

A double-beat note is written 𝅗𝅥 — minim. A four-beat note is written 𝅝 — semibreve.

A dot after the note increases the duration of the note by half as much again, for example:

♩· is a one-and-a-half beat note;

♩·· is a three-beat note.

Sometimes you will see notes linked by a curved line. If the notes are of the same pitch and next to each other they should be treated as a single note. If they are different pitches, or if there are notes between them, they should be treated as two separate notes.

Finally we reach rests. As the name implies, they are pauses in the music. There are two of them:

𝄽 — pause for a single beat.

𝄾 — pause for a half beat.

Initially it is easiest to give a single-beat note the value 1. That will tend to lead to very slow tunes but I will demonstrate a way to deal with the difficulty.

Note the figure after the treble clef at the start of the music. Usually this is $^{2}_{4}$, $^{3}_{4}$, $^{6}_{8}$, or $^{4}_{4}$. The symbols C or ¢ are sometimes used to denote $^{4}_{4}$ time. For the sake of simplicity you can take $^{6}_{8}$ as being the same as $^{3}_{4}$. There are differences but we are not delving deeply into musical theory.

To check your beat values, count the number of beats in a bar, i.e., between two adjacent vertical lines across the whole of the stave. The number of beats to the bar should equal the top figure, i.e., $^{2}_{4}$ time has two beats per bar; $^{3}_{4}$ time has three beats per bar; and the like.

Then you are ready to change the music into BEEP commands. For each note write first the number of beats and then the pitch as in figure six.

So the instruction:

```
10 BEEP 1,7: BEEP 1,11: BEEP 1,11:
   BEEP 3,11: BEEP 1,7: BEEP 1,9:
   BEEP .5,11: BEEP .5,9: BEEP 3,7:
   BEEP 2,7
```

would play the notes but rather slowly. A better speed would be obtained by:

```
10 BEEP .66,7: BEEP .66,11: BEEP
   .66,11: BEEP 2,11: BEEP .66,7:
   BEEP .66,9: BEEP .33,11: BEEP
   .33,9: BEEP 2,7: BEEP 2,7
```

The method of writing tunes shown in the foregoing program is satisfactory for a few notes. It can, however, become tedious for a long tune, especially if you wished to vary the key or tempo of the music. A more flexible approach would be:

```
10 FOR n=1 TO 10
20 READ a,b
30 BEEP a,b
40 NEXT n
50 DATA  .66,7, .66,11, .66,11, 2,11,
         .66,7, .66,9, .33,11, .33,9,
         2,7, 2,7
```

The advantages are not immediately obvious but look what happens if you replace a by a/3. Line 30 becomes:

```
30 BEEP a/3,b
```

and line 50 becomes:

```
50 DATA  2,7, 2,11, 2,11, 6,11, 2,7,
         2,9, 1,11, 1,9, 6,7, 2,7
```

That greatly simplifies entry, especially for a long tune.

Rule five is to give the shortest note in your tune a value 1. Adjust the tempo in your BEEP statement. That avoids decimals in your data.

In this program p must be positive and q may be either positive, negative or zero. Neither p nor q need be whole numbers.

Finally, you can arrange the program so that you do not have to press RUN and ENTER every time you want to hear the tune.

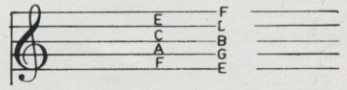


Figure 4

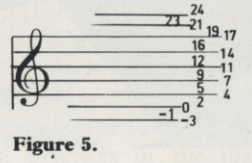


Figure 5.

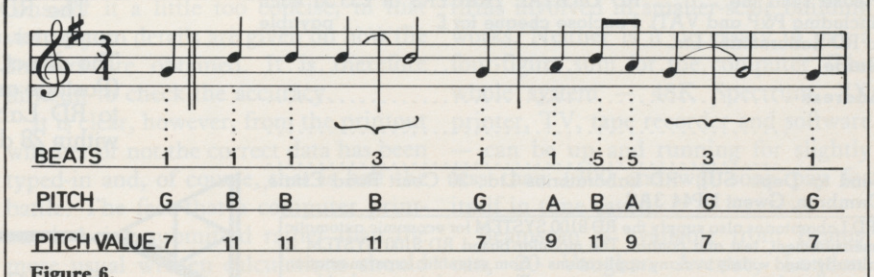
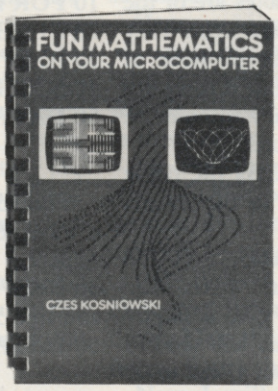


Figure 6.

Fun Mathematics on Your Microcomputer

CZES KOSNIOWSKI

This entertaining, original book shows how to use a personal computer for recreational mathematics, providing an endless source of ideas for the personal computer user. Learn some fascinating mathematics, play some intriguing games and develop your computing skills. Find out about 'making snowflakes' and about 'confused but loving husbands', discover 'polar honey bees' and play Treasure Hunt. Each chapter introduces an important part of mathematics, explains the fundamental ideas and incorporates them into computer programs. All the programs are written in BASIC and are readily adaptable to individual computers.



£4.95 net

CAMBRIDGE UNIVERSITY PRESS

Are your finances driving you mad?

Do you find that working out your finances makes your head buzz? Do you see red?
Don't worry, now you can have Hilton's **Personal Banking System** on your side, giving you a clear head start and (hopefully) putting you back into the black!
Maintain permanent records and fully detailed statements of your finances including:
★ **All** cheque book transactions and bank receipts
★ **All** standing order payments
Automatically Processed (monthly, quarterly, six-monthly or annually **and** for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included.
Additional **Bank Reconciliation** module available to automatically match your Bank Statement to your **Personal Banking System** account.
Full instructions included and **guaranteed** after sales maintenance provided.

★ **PBS ZX81 £8.95 (16K)**
★ **ZX SPECTRUM £9.95 (48K)**
★ **DRAGON £9.95 (32K)**
Bank reconciliation (for use with above) £5.

Ask for the PBS at your local computerstore.
ORDER by POST (specifying machine)
OR at the POST OFFICE using TRANSCASH ACCOUNT 302 9557

HILTON COMPUTER SERVICES

Hilton Computer Services Ltd
(Dept SU) 14 Avalon Road, Orpington, Kent BR6 9AX

★ **YOUR PBS IS NEVER OUT OF DATE** ★

INSTANT IMAGE TRANSFER TO ZX SPECTRUM
RD DIGITAL TRACER £55.50

Please send me .....RD DIGITAL TRACERS at £55.50 each (including P&P and VAT). I enclose cheque for £ ..... payable to RD Laboratories Ltd.

Name .....

Address .....

.....

.....

Send to: Dept. SUJ, RD Laboratories Ltd., 20 Court Road Estate, Cwmbran, Gwent NP44 3AS

RD Laboratories also supply the RD 8100 SYSTEM for economic automatic measurement, test and control. The modular-based RD 8100 SYSTEM is already used widely in many applications – from scientific experimentation to small-scale energy management systems. Please send stamp and address for brochure.

The high resolution colour graphics of the ZX Spectrum permit accurate presentation of complex or irregular images – maps, technical drawings, even personalities. But entering individual co-ordinates for unusual shapes can be tedious and time-consuming.

The RD DIGITAL TRACER cuts out tedious plotting. It provides instant transfer from original to diplay file – for screen display, ZX printer printout, or retention on cassette.

The RD DIGITAL TRACER is supplied with tracing sheet, software cassette and full instructions on use. Latest software includes fast colour fill, audible keystroke acknowledgement, fast PAPER colour change and fast LOAD from saved display file.

This is an invaluable tool for engineers, architects and other technicians, and for educational use in the presentation of lectures, and in computer training and application. Designed for the ZX Spectrum, the RD DIGITAL TRACER as supplied is compatible with ZX 81, although high resolution colour graphics are not available on this machine.

The RD DIGITAL TRACER is available from computer shops or direct from RD Laboratories. The direct, UK only, price of £55.50 includes VAT (Postage and Packing free). Send a cheque (payable to RD Laboratories Ltd.) with order for delivery within 28 days, or ask your local dealer for details.

R D Laboratories Ltd

20 Court Road Estate Cwmbran Gwent NP44 3AS
(06333) 74333

New ground broken by powerful architects' aid

Sinclair machines are regarded still as little more than toys. David Marsh disagrees in this review of a new cassette

APART FROM generalised spreadsheet programs of the Vu-calc and Vu-file variety, there has been little or no Spectrum software written for serious commercial applications. Something of a new departure in that direction is a specialised program, Beamscan, which is used to calculate the sizes of steel beams used in building construction.

The program is used interactively, with the screen prompting the user at all stages and asking for details of the loads. A diagram of the beam is displayed on-screen, which makes it clear exactly what information is being requested by the computer. The program seems well error-trapped and user-friendly. When all the data is in, there is a wait of about one minute while the numbers are crunched and then diagrams are displayed giving shear force and bending moment along the beam.

From its library of standard steelwork sizes, the program recommends a choice of up to eight suitable sections with stress and deflection for each. All the regular rolled steel joists, universal beams, universal columns and rolled steel channels in grade 43 steel are featured and a moment of inertia can be obtained for timber beams, from which it is a simple matter to choose a suitable section.

The beam must be simply-supported and single span. Cantilevers are not within the scope. That is perhaps the only limitation worth mentioning. Any combination of point loads, distributed loads and uniformly-tapered loads in any number up to a total of 99 can be specified.

What is more, the distributed loads do not have to extend to the end of the beam. Within the designated span of 0.3 to 20 metres, it is difficult to visualise any beam which could not be analysed by the program.

Point loads frequently consist of the end reactions of other beams. Both end reactions are given, which covers that point and also is a great help in finding the stress in any supporting brickwork. Also given are the maximum bending moment and shear force, the deflection co-efficient, the permitted deflection and optimum moment of inertia.

That would mean that other types of beams, for example round or rectangular hollow sections, could then be chosen using the data given in BS4.

For each beam size chosen, the L/ry and D/T ratios are given, together with

permissible and actual stresses, actual shear stress and deflection.

All that information can be put into the form of a calculation sheet using the ZX printer. That can then be submitted to the client or to the local authority responsible for checking the design. Although full data is given on the results and the presentation is clear and concise, perhaps some local authorities may consider it a little too concise, in that virtually no details are given on how the answers are obtained. It is therefore difficult to check the accuracy.

It is clear, however, from the printout whether or not the correct data has been typed-in and, of course, that is half the battle. The fact that a computer printout is being submitted rather than the more usual written calculations should lend a reassuring air of professionalism.

It is also probable that in the perhaps not-too-distant future when most calculations are made in this fashion, various programs will become widely-known and generally accepted in the profession as being accurate. Some kind of type-approval system might even be possible so that checking would be limited to the data output.

That would be in line with the procedure followed in other areas, where certain materials, for example building blocks, are given a certificate to indicate that they comply with building regulations. If that make is used, then no further proof is required that they meet the requirements. Extending the concept to software seems logical and almost inevitable.

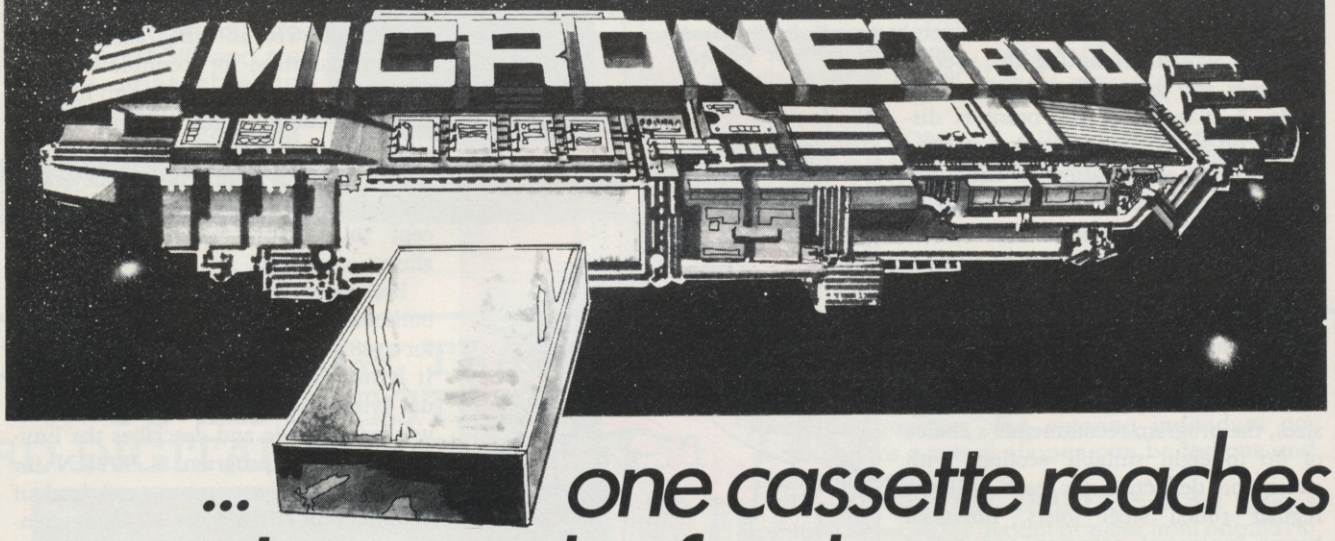
Beamscan is supplied recorded on both sides of the cassette and is suitable for a 48K Spectrum, being about 35K. It is supplied with a well-written manual which guides the user through a worked example and describes the limitations of the program as 999KN for each load to a maximum total load of 10,000,000KN from the 99 loads mentioned. They scarcely seem like limitations when there are other costlier beam design programs for bigger computers which cater for a maximum of eight point loads while others cannot calculate the shear force or bending moment.

At £25, it appears costly compared to the usual programs in *Sinclair User* but it is a more specialised item with a lower volume sale than games or spreadsheets and is much less expensive than anything comparable.

It should be ideal for small architectural practices or the many one-man firms involved in smaller-scale building works. Neither is it necessary to pay a four-figure sum for the computer. The whole system — 48K Spectrum, ZX printer, TV, tape recorder and software — can be up and running for slightly less than £300 and will soon pay for itself in time saved.

Beamscan is available from Beamscan, 20 Vaughan Avenue, London, NW4 4HU. Tel: 01-202 8656.

Dock your games software into Britain's largest home-user database...



... one cassette reaches thousands of enthusiasts.

Micronet 800 is a powerful new service that opens up a whole new world of opportunities for microcomputer users.

When this huge database was launched just a few months ago, it attracted thousands of enquiries from home computer enthusiasts who could see the huge new vistas when you link microcomputers with Micronet 800... an 'Aladdin's Cave' of hundreds of games programs which can be downloaded to individual machines... hundreds of thousands of pages of news, reviews, product data and prices from the computer world and from *Prestel*... and an electronic mail-box for exchanging messages and ideas with other users right across the country.

All this for around a modest 15p a day. Subscribers are linked by telephone through a modem, making it the fastest and most direct means of selling your games software downline to machines like the BBC Micro, ZX Spectrum, ZX81, Apple II, Tandy TRS80 and PET.

Make a name for yourself in games software. Send your disk or cassette, together with the coupon to Micronet 800 at the address below.* We will validate the program, and let you know what you stand to gain from Micronet 800.

micronet 800

Micronet 800
Bushfield House
Orton Centre
Peterborough PE2 0UW

Name _____
Address _____
_____
_____ Tel: _____
Name of Program _____
Type of Program _____ Type of Micro _____
☐ Please tick box if you are interested in becoming a Micronet 800 subscriber.

SP6

*We cannot return cassettes or disks unless a stamped addressed envelope is enclosed.

JOIN THE USERS' CLUB

FREE BOOK!

Make the most of your Spectrum or ZX81 by joining the country's strongest and most enthusiastic users' club—the National ZX Users' Club.

When you join us, we'll send you our 'new members welcome pack' with *30* programs (15 for the ZX81, 15 for the Spectrum), plus the first issue of our value-packed club magazine INTERFACE.

Inside INTERFACE as well as at least six programs for your ZX81 or Spectrum, you'll find letters from members as they share tips and ideas, and sound off on a variety of subjects (such as you-know-who's appalling delivery times record), a list of local ZX clubs, and special offers from software houses and book publishers—special offers just for members.
If you're having problems with your computer, we have experts on tap to try and help you. If you want to start a local users' club, we'll give you publicity, and let you buy books at a special discount for your club members.
If you're not a club member, you're missing out on making the most of your micro (and try saying that ten times quickly!)
Come on in and join us, the water's fine. It's £9.50 for a year's INTERFACE, and we'll send you a sample issue for £1.00

Run by Tim Hartnell, the National ZX Users' Club is a resource just waiting to be tapped. Come on and start tapping.

National ZX Users' Club,
Dept. *SU*
44-46 Earls Court Road,
London, W8 6EJ

OK, Tim, you've convinced me:

( ) Send me my 'new members' welcome pack' plus my first issue of INTERFACE and keep those INTERFACES coming for the next year. I enclose £9.50 (UK), £12.50 (Europe)

( ) Just send me a sample of INTERFACE. I enclose £1.00

I have ( ) a ZX81 ( ) a Spectrum

Name .....

Address .....

.....

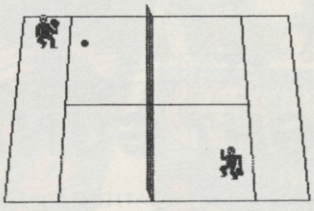
ZX SPECTRUM
16K AND 48K
NEW SPORTS GAMES

New action sports games feature a 3D view of the game. In football and tennis you play one side, the computer plays the other. The computer is fast and hard to beat. Different skill levels.

FOOTBALL
Each player can move, shoot etc. independently. Includes fouls if players collide, corners, throw ins etc. Scale 90 minutes play. Any team of names can be used. Game can be suspended and player numbers shown at the press of a key. **Price £5.50**

BIG MATCH SOCCER
Just like football game but for 2 players. Each player uses keys at his side of the keyboard to control his men. All men can be moved, shoot etc. independently. Practice with football then play your friends in the big match. **Price £5.50**

SUPER SOCCER
A deluxe version of the football. Even faster action, harder to beat. Choose team colours etc. **Price £7.00**

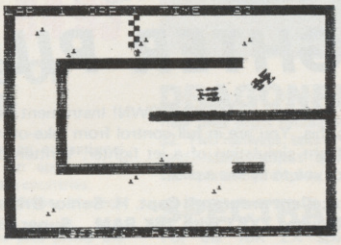


TENNIS
Each key plays a different stroke. Move your players anywhere on court. Computer plays a hard game. All tennis rules used, just like the real thing. Proper serving and scoring. Plays 3 sets. Animated figures. **Price £5.50**

TANK BATTLE
3D view from the tanks turret of woods, villages, attacking tanks etc. Shots can destroy buildings, trees and enemy tanks. 360 degree turret movement. **Price £4.50**

PINBALL
Flippers flashing lights etc. Like an arcade machine. **Price £3.95**

DESTROYER
Planes attack your ship with bombs, and submarines with torpedoes. Defend with guns and depth charges. **Price £3.95**



CAR RACE
You drive one car the computer the other. Control your car with steering and brakes. Choice of 2 circuits. Lapcounters and time recorded. **Price £3.95**

SPACE FIGHTER
Pilots eye view of space. Attack aliens, dock with refueling ship in flight. **Price £4.50**

SUPER SPACE INVADERS AND MAZE MUNCHER
Now both on one cassette, great value at only **£4.50**

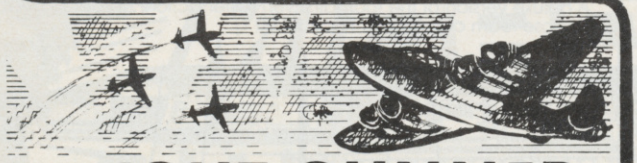
SUPER OFFER Spend £15 and get any extra game free

Please add 35p post and packing per order

**WINTERS LTD, DEPT S.U, 24
SWANNINGTON CLOSE, CANTLEY,
DONCASTER, S/YORKS DN4 6UA**

THIS SPACE INTENTIONALLY LEFT BLANK

Your masterpiece could appear here. We need good, original machine-code programs for the Spectrum and Oric. Excellent royalties or cash payments offered for high quality games. If you have written an exceptional program, please send a copy to the address below for immediate evaluation.

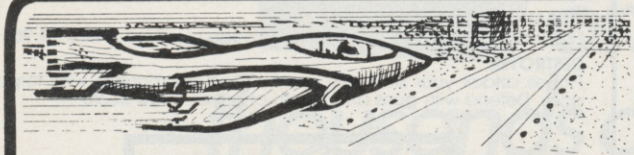


NIGHT GUNNER

Enemy aircraft approaching . . . BATTLESTATIONS!! Waves of enemy fighters swooping in for the attack? Can you survive another mission? This is the ULTIMATE challenge. An entertaining machine code game with excellent graphics. Requires ZX81 with 16K RAM pack.

Highly addictive! **£4.95 inc.**

Now Available at major branches of WHSMITH



FIGHTER PILOT

15 feet . . . 7 feet . . . TOUCHDOWN! Instrument landings are not always as easy as this. You are in full control from take-off to landing during this real-time flight simulation of a jet fighter. Written by pilots — tested by pilots — for you to fly like a pilot.

'An excellent program!' Capt. H. Senior British Airways pilot.
Requires ZX81 with 16K RAM Super value at £4.45

DIGITAL Integration

DIGITAL INTEGRATION
Dept. SU
22 Ash Church Road,
Ash, Aldershot
Hants GU12 6LX.

MAIL ORDER ONLY

TRADE ENQUIRIES WELCOME

All prices inclusive
(Overseas add £0.55 p&p per tape)
All products guaranteed, refund if not satisfied.

HIRE ZX81/SPECTRUM PROGRAM TAPES

Make the most of your computer by hiring from the original and still the only software library offering all these features:

- Over 900 tapes stocked, offering more than 120 different programs from 39 suppliers (all with their permission)—many of the best currently advertised, plus some specially commissioned—and the range increases each week!
- Arcade, adventure and simulation games, many business and home utilities, graphics, education...and so much more besides
- Descriptive catalogue helps you make your choice
- **Free** quarterly, illustrated magazine includes tips from a professional programmer, DIY plans, reviews, letters, discount offers—and our **Top 40 Tapes** chart averaged from thousands of members' scores
- Full-time staff offer you a friendly, efficient welcome & service
- A fortnight's hire for just £1 +40p p/p—hire what/when you like
- All tapes guaranteed loadable
- Help given with loading problems (azimuth test tape available) and with marketing members' programs
- You may switch from ZX81 to Spectrum at any time
- Send SAE for details—or join on money-back no-risk approval today

The SINCLAIR OWNERS'
SOFTWARE LIBRARY
Warren Road, Liss, Hants GU33 7DD.

Please send me on money-back approval my magazine, descriptive library catalogue and order form, on the understanding that if I'm not delighted with your service within 28 days you will refund my money in full.

NAME.....

ADDRESS.....

.....

Please enclose cheque/P.O. for £8.50 (year's ZX81 membership)/ £9.50 (Spectrum). Overseas £2 extra in each case. SU

HIGH RESOLUTION INVADERS FOR 16K ZX-81

No its not a printing error! We utillise a **SOFTWARE ONLY** technique developed by Steve Briers BSc to produce a stable 248 by 224 pixel display.

ABSOLUTELY NO HARDWARE MODIFICATIONS, ARE REQUIRED.

This is the only program that can achieve this without using expensive add-ons. But the graphics are just one feature from a long list:

- Game options — one or two players — taking turns or playing simultaneously!
- Adjustable bomb dropping and missile firing rates.
- Advanced keyboard scanning routines to aid game playing.
- All options selectable under program control (no POKEing around).
- Game can be stopped at any time.
- Three types of invader with graded scoring in a 5 × 11 array.
- Saucers appear at intervals.
- Protective shields.
- Difficulty increases as game progresses.
- Base explosion effect when hit.
- Uses 99% of available memory.
- Recorded twice on a high quality cassette.
- Instructions on how to load and play the game included.
- Only £4.95

Also available
HIGH RESOLUTION SWARM at £4.95

ODYSSEY COMPUTING
28 BINGHAM ROAD,
SHERWOOD,
NOTTS
NG5 2EP

HEWSON CONSULTANTS

Items from this advertisement **are available through W.H. Smiths,** larger branches of Boots and all leading micro computer retailers.

SPECVADERS

16K Spectrum.
Defeat each squadron of Beeple Zaps and another appears only closer. Cyrian mother-ship with ejecting Zeetle Baps.
5 levels of play from Orions snail's pace to close your eyes and hope. Real time scoring. 3 lives. Pan galactic gargle blaster for highest score. Descending asteroids.

£4.95

HEATHROW

AIR TRAFFIC CONTROL
For the 16K Spectrum.
YOUR TASK: to direct incoming aircraft from holding stacks to runway – smoothly, safely and expeditiously.
YOUR INSTRUMENTS: Radar screen showing aircraft call signs, blips and trails. Four stack displays giving altitude, heading, speed and size.
SEVEN levels of play including a demonstration mode.
FEATURES: mixed aircraft, restricted airspace, minimum separation, outbound traffic, emergencies, unknown aircraft, radio failure, loss of a runway, instrument failure ...

£7.95

NIGHTFLITE

16K Spectrum, NOW WORKS WITH THE KEMPSTON JOYSTICK.
NIGHTFLITE puts you at the controls of a light aircraft flying at night. You can: climb, descend, take off, land, bank left or right, navigate between beacons, raise/lower the flaps, raise/lower the undercarriage, adjust engine rpm, raise/lower the nose varying amounts.

£5.95

BACKGAMMON

For the 16K Spectrum.
8 levels of play from novice to expert. Full colour display of tables and dice. Gamble on a single game or a series, double or quits. All the features of the ancient game.

£5.95

QUEST

Explore the dense forest, gloomy castle, maze and mountains, confront the dwarves, elves, dragon and centaur. Your QUEST is to locate the ancient scroll. An enthralling adventure for the 48K Spectrum.

£5.95

MAZE CHASE

For the 16 and 48K Spectrum. 4 or 12 mazes, highest score to date, 4 independent guardians, 3 lives, full colour, fast machine code action, magic strawberries, eat lemons to score more, real time scoring.

£4.95

COUNTRIES OF THE WORLD

16 and 48K on one cassette.
Countries of the World is an educational package designed to give an appreciation of the location of all the main countries.
16K version shows the position of each country and names its capital.
48K version: all the above plus prints the population, size, currency, and main languages of each country, and statistics on largest and smallest countries etc.

£5.95

DRAGONFLY

Real time flight simulator for the DRAGON 32. Two runways, take off, land, bank, adjust trim, full instrument display.

£6.95

SPECTRALPANIC

For the 16K ZX Spectrum. Climb the ladders, dig holes, bury monsters, eat the power pill, move fast to avoid being eaten. On screen scoring, 3 lives.

£5.95

£5.95 EACH

40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM
by Andrew Hewson and John Hardman
How to load and save machine code. How to use the system variables. How program lines are stored. How to use the stack, the display, the attribute files.
ROUTINES: Scroll – up, down, side to side by pixel or by character. Rotate character, invert character – horizontally and vertically. Line renumber – including GOSUBs, GOTOs, RUN etc., and many more.

20 BEST PROGRAMS FOR THE ZX SPECTRUM *by Andrew Hewson*
Program titles include: Machine Code Editor Index File – filing system
for the ZX Spectrum. Duckshoot. Graphix – construct up to 210 graphics. Plus football, digitiser, diary and many more.

Trade inquiries welcome

Name _____ Product _____
(Block Capitals Please)

Address _____

_____

_____ Signed _____

My Access/Barclaycard No. is _____

Post to: **HEWSON CONSULTANTS**, 60A St. Mary's Street, Wallingford, Oxon OX10 0EL.
Tel (0491) 36307.

Make cheques/PO's payable to Hewson Consultants

JOYSTICK SOFTWARE

Spectrum Joystick Interface
ONLY £15·00

Allows you to use any Atari/Commodore type Joystick with the Spectrum. Simply plugs into the Spectrum. Complete with 12 months' guarantee.

JOYSTICK COMPATIBLE SOFTWARE FROM

KEMPSOFT

FOR THE SPECTRUM

ORDER NOW!

☐ Astro Blaster	16K Quicksilva	£4·95	
☐ Blind Alley	16K Sunshine	£4·95	
☐ Cosmic Guerilla	16K Crystal	£5·95	
☐ Cosmos	16K Abbex	£5·95	
☐ Cyber Rats	16K Silversoft	£5·95	
☐ ETX	16K Abbex	£5·95	
☐ Frenzy	16K Quicksilva	£4·95	
☐ Frogger	16K DJL	£5·95	
☐ Galaxians	16K Artic	£4·95	
☐ Gulpman	16K Campbell Sys.	£4·95	
☐ Jet Pac	16K Ultimate	£5·95	
☐ Joust	16K Softek	£5·95	
☐ Knot in 3D	48K New Gen	£5·95	
☐ Mazeman	16K Abersoft	£5·95	
☐ Meteoroids	16K Softek	£4·95	
☐ Night Flite	16K Hewson Cons	£5·95	
☐ PSSST	16K Ultimate	£5·95	
☐ 3D Tunnel	16/48K New Gen	£5·95	
☐ Time Gate	48K Quicksilva	£6·95	
☐ Slippery Sid	16K Silversoft	£5·95	
☐ Spookyman	16K Abbex	£4·95	
☐ Conversion Tape I	Kempsoft	£4·95	
☐ Conversion Tape II	Kempsoft	£4·95	
☐ Spectrum Joystick interface only £15·00			

Please tick appropriate boxes.
Prices include P&P and VAT. Overseas prices add £4·00 P&P Total £

Cheques/Postal Orders should be made payable to Kempston (Micro) Electronics Ltd.

Name _____ Signature _____

Address _____

Please debit my Access/Visa* Account No.

Kempston (Micro) Electronics Ltd, Dept SU7 * Delete as applicable
180a Bedford Road, Kempston, Bedford MK42 8BL

ROSE SOFTWARE ANNOUNCES THREE BRAND-NEW CASSETTES for the 16K or 48K Spectrum

£4.95 per cassette

G.C.E. "O" LEVEL MATHS REVISION
EQUATIONS AND INEQUALITIES
6 teach and test programs covering linear equations, simultaneous equations, quadratic equations and inequalities. Help facilities available and an explanation of the correct answer.

G.C.E. "O" LEVEL MATHS REVISION
GEOMETRY
6 programs of multiple choice questions covering properties of parallel lines, triangles, various polygons and circles. Questions use generated numbers. Explanations are given.

QUAZER
Test your quick thinking as well as your quick reactions with these four programs of quizzes combined with a fast action machine code maze. Select the correct answer 1, 2 or 3 and zoom your man to the answer in the maze before the archer shoots you. All questions have RND function built in.

Send sae for catalogue of all our products to ROSE SOFTWARE 148 Widney Lane, Solihull, West Midlands B91 3LH.

TELESOUND 84

(Patent Pending)

ZAP

SPECTRUM BEEP BOOSTER

... Puts Sound Through TV ...

Probably the world's smallest sound modulator, measuring 2½ x 1½ x 1cm, TELESOUND 84 fits inside the ZX Spectrum and most other home computers to enable the BEEP to be heard directly from an unmodified TV. Sound can be controlled by the TV from a whisper to a roar. Fitting takes only minutes with three easy snap-on connections, eliminating soldering. Dealer enquiries welcome.

TELESOUND 84 costs £9.95 inclusive from

COMPUSOUND

32 Langley Close, Redditch
Worcs B98 0ET

John Gilbert reviews the latest titles on the bookshelf

Guides for beginners

PUBLISHERS are beginning to realise that there are few general introductory books to computers on the market. Several new titles have been released in the last few months and they have steered clear of introductions to specific machines.

The Pre-computer Book by F A Wilson is published by Bernard Babani. The book has an odd title but that is the only strange thing about it. Wilson provides an introduction for the complete beginner. The concept of the computer is examined, together with such diverse subjects as number bases, hardware and simple programming. As a result it covers a great deal in very few pages.

The book will satisfy your curiosity if you want to know what a byte is or where to find the ROM of a machine, but if you are looking for very detailed information, this general guide is not for you and does not pretend to be.

The Pre-computer Book costs £1.95 and is one of the least expensive books which have been reviewed to date.

Another book for the complete beginner is *Programming for Real Beginners* from Shiva Publishing. The author is Philip Crookall. It is a general introduction to computers and does not stay on the theme of programming. It may be useful to someone who is beginning a course in computer studies and would suit anyone doing CSE or O level. It is available for £2.95.

For people who want to go a few stages further, Century Books thinks that it has provided the definitive text on Sinclair machines with its *Century Computer Programming Course.* What it has done is to publish a massive tome of text which is not indexed in any way. The book contains some interesting information on both machines but there is no way to find the information quickly. A proper index would, most probably, occupy another 10 pages.

While the expansion into the general sector of the market has been taking place, more Spectrum books have appeared. The state of play seems to be that anyone will do anything for a Spectrum.

The Century Computer Programming Course is written by Peter Morse, Ian Adamson, Ben Anrep and Brian Hancock. It costs £9.95 and is well worth the money.

The recent release of the *Complete Spectrum ROM Disassembly,* by Dr Ian Logan and Dr Frank O'Hara, must be a great relief to many machine code programmers who want to get to grips with the Z-80A processor inside the machine.

The book is published by Melbourne House and gives a detailed breakdown of all the routines in the ROM, including information on I/O routines, arithmetic and floating point calculations and the re-start routines at the beginning of the ROM.

Machine Code
BRAINTEASERS FOR BASIC COMPUTERS
Programming for REAL Beginners
Advanced Graphics with the Sinclair ZX Spectrum
THE ZX SPECTRUM

The Complete Spectrum ROM Disassembly costs £9.95. It is slightly overpriced, although the information is worth having.

A book on machine code, *Spectrum Machine Code,* has been published by Shiva. The authors are Ian Stewart and Robin Jones and their handling of the subject is excellent, so far as it goes.

The book is very thin, although it provides a great deal of information. The chapters on the display and attribute files of the Spectrum are very interesting and will be of immense value to anyone who wants to use machine code graphics within programs.

Spectrum Machine Code is part of the Shiva Friendly Micro series and costs £5.25.

Advanced Graphics with the Sinclair ZX Spectrum by I O Angell and B J Jones is published by Macmillan Press. The authors are obviously academics, as the book seems to be aimed at those with a great technical understanding of the Spectrum and also a knowledge of Cartesian co-ordinate geometry. It is written rather like a treatise, with many references to other books in the main text.

It is well-presented and provides plenty of technical information. The authors show how to develop arcade-quality graphics and also go into the realms of three-dimensional animation. The problem is that many Spectrum users would lose their way in the book, not because of any failing on their part but because of the authors' narrative style. *Advanced Graphics with the Sinclair ZX Spectrum* costs £9.95.

The ZX Spectrum — Your Personal Computer is published by Prentice/Hall International and written by Ian McLean, Simon Rushbrook Williams and Peter Williams.

The first third of it is taken-up by drawings of the Spectrum keyboard with marks showing the relevant key positions. Some readers may regard that as an insult to their intelligence, as all of those key functions are marked clearly on the Spectrum.

There are, however, several redeeming features. The text is clearly set out and the examples are excellent. The chapter on loading and saving programs is useful but merely repeats the one in the Spectrum manual.

It is a useful adjunct to the Spectrum manual and costs £5.95.

Melbourne House (Publishers) Ltd, Glebe Cottage, Glebe House, Station Road, Cheddington, Leighton Buzzard, Bedfordshire, LU7 7NA.

Bernard Babani (Publishing) Ltd, The Grampians, Shepherd's Bush Road, London, W6 7NF.

Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire, CW 5 5RQ.

Macmillan Press, 4 Little Essex Stret, London, WC2R 3LF.

Prentice/Hall International, 66 Wood Lane End, Hemel Hempstead, Herts, HP2 4RG.

Right before your eyes and beyond your wildest dreams!

HOBBIT

and

PENETRATOR

"The HOBBIT is far superior to any other adventure." YOUR COMPUTER. "One of the most complex games for the Sinclair." SINCLAIR USER. "A lot of fun." COMPUTING TODAY. "A very impressive piece of software." WHAT MICRO. "A marvellous game." ZX COMPUTING. "A game by which future games will be judged." P.C.T.

The HOBBIT for 48K Spectrum £14.95

"PENETRATOR is my pick - it succeeds in being immensely playable yet very difficult and horribly addictive." COMPUTER & VIDEO GAMES. "The graphics are superb - a great game." P.C.T. "One of the most challenging games - few games for any micro offer as many user facilities." PRACTICAL COMPUTING. "The best game ever for the Spectrum." SPECTRUM USERS CLUB, KINGSTON.

PENETRATOR for 48K Spectrum £6.95

MELBOURNE HOUSE PUBLISHERS

Orders to: 131 Trafalgar Road, Greenwich, London SE10

Correspondence to: Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA

Trade enquiries welcome.

☐ Please send me your **free** 48 page catalogue.

Please send me:

SPECTRUM Books

☐ Understanding Your Spectrum	£7.95	☐ Over The Spectrum	£6.95
☐ Spectrum Machine Language For The Absolute Beginner	£6.95	☐ The Complete Spectrum ROM Disassembly	£9.95
		☐ Spectrum Hardware Manual	£5.95

16K SPECTRUM Cassettes

☐ Over The Spectrum No. 1	£5.95
☐ Over The Spectrum No. 2	£5.95
☐ Over The Spectrum No. 3	£5.95
☐ Programs from Spectrum Machine Language Book	£5.95

48K Spectrum

☐ Penetrator	£6.95
☐ The Hobbit	£14.95
☐ Terror-Daktil 4D	£6.95

Please add 80p for post and pack £ .80

TOTAL £ _____

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.

I enclose my cheque/money order for £ _____

Please debit my Access card No. _____ Expiry date _____ Signature _____

Name _____ Address _____

_____ Postcode _____ SU7

MELBOURNE HOUSE PUBLISHERS

SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

SPECTRUM FAMILY LEARNING SERIES

Use our Computer Assisted Learning PACks to help your children with their school work. The programs in the series use moving colour graphics and sound to make learning more enjoyable. Each pack contains four programs and is suitable for use with the 16K or 48K Spectrum. Program notes are supplied.

CALPAC FL1 (5 to 8 years) **£7.50**
Tens and units addition and subtraction with detailed help facilities; powerful, easy to use drawing program; English comprehension applied to American Indians.

CALPAC FL2 (7 to 10 years) **£7.50**
Roman history; spelling tester with easy entry of your own lists; flexible table-tester; homophones.

CALPAC FL3 (9 to 12 years) **£7.50**
Nouns, verbs, adjectives and adverbs; tenses of verbs; biology of the flower; long division tutor.

The programs are ideal for the ages stated, but could be used by anyone requiring revision of these areas of study.

CALPAC C1 O-LEVEL CHEMISTRY £7.50

Four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- ★ Elements, compounds and mixtures.
- ★ Structure, bonding and properties.
- ★ Redox, electrolysis and the activity series.
- ★ Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns, Woking, Surrey GU21 1UF.

Overseas orders £8.50; includes airmail postage.

SINCLAIR OWNERS READ THIS FROM DCP

You've probably heard about MACHINE CODED PROGRAMS and thought "so what! How can they help me?"

Well now you can find out and taste the very real difference by purchasing our latest MACHINE CODED programs. These emulate features of the most modern professional computers (12 years writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about).

Just read the specification and you'll see what we mean.

MACHINE CODE TEST TOOL

The ultimate professional tutor and de-bug program, we wrote this to help us write our own programs.

- **TEST** and display machine code instructions as they're written.
- **IDEAL** for both the novice and the expert.
- **FULLY** documented with a 32 page tutorial
- **HEX:DECIMAL** conversion as standard.
- **CHARACTER GENERATOR** — of unbelievable quality
  Supplied free with the Spectrum version.

Available for the 16K ZX81 and 16/48K Spectrum.

SPECTRUM CHESS *(48k only)* Dare you face The Turk

The original Turk was an eighteenth century automaton, a life-size mechanical figure resplendent in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCP now offer you the twentieth century equivalent of that Turk — a chess-playing computer program.

The Turk challenges you to a game of chess!

MANY OPTIONS INCLUDE:
- 6 LEVELS OF DIFFICULTY
- DEMONSTRATION MODE
- BOARD EDITOR
- GAMES PRINTOUT FACILITY
- BLITZ CHESS AGAINST THE CLOCK
- TWO PLAYER MODE
- UNFINISHED GAMES CAN BE STORED
- RECOMMENDED MOVE

FULL INSTRUCTIONS PROVIDED

ADDRESS MANAGER.....

Works on the 16K and 48K Spectrum, in 48K it will store, file, select and retrieve over 400 full addresses (over 1500 individual names); Dynamic Memory Management and compression techniques makes all this possible and there's a lot more:

- **FULL SCREEN INPUT and EDITING** — see it as a page as it happens with insert, delete and TAB Commands.
- **MULTIPLE INDEXING** — 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications.)
- **INSTANT RESPONSE** — yes, this program is very very fast.
- **SUPER FRIENDLY** — crash-proof, extremely easy to use and efficient in a way that BASIC can never be.

MANY USES
- **AT HOME** — (storing addresses, printing out Xmas Card lists etc.)
- **AT WORK** — for mail-order work, internal telephone directory, sorting customers into types, areas, size ... you choose.
- **CLUBS** — print-out members list, sort different categories etc.

MACHINE CODE..IT MAKES ALL THE DIFFERENCE.....

Post order to: Oxford Computer Publishing Ltd., P.O. Box 99, Oxford.
Please rush me: **Address Manager** at £8.95 each. ☐ Spectrum only.
Chess The Turk at £8.95 each. ☐ Spectrum only.
Machine Code Test Tool at £9.95 each.
Tick box for edition required: ☐ ZX81 ☐ Spectrum
Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to (0753) 888866

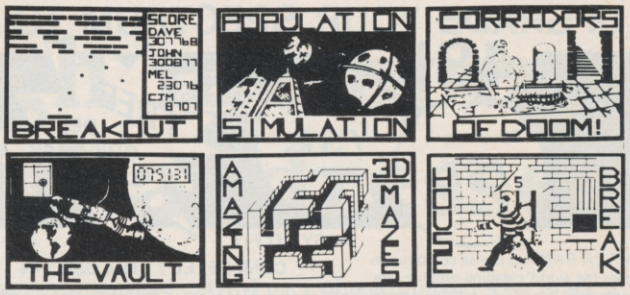
NAME: .....

ADDRESS: .....

POSTCODE: .....

Available from most branches of **W H SMITH** and other retailers. DCP

ZX SPECTRUM — ZX-81 SUPER SOFTWARE PACK



25 Great programmes on one pack: Star Wars, Gambling Machine, Breakout, Trap It, Population Simulation, Corridors of Doom, Housebreak, Towers of Hanoi, Butterfly Chase, The Vault, Yahtzee, Maths, Calendar, Amazing 3D Mazes, 3D Noughts & Crosses, Jackpot Bandit, Hangman—Musical, Bible, History and Sport, Mastermind, Spelling, Diary, Records File, and Time Warrior.

Here are descriptions of just a few of the games:

HOUSEBREAK: You enter a house at night in an attempt to rob it of money and any gold and silver items you can find. Your object is to clean out the house. In the dark you must avoid bumping into the furniture. After an interval of time an alarm will sound and a short while later the lights will be turned on. A vicious dog is then released and you have to use all your skill and cunning to avoid getting bitten as he chases you around the house. Any injuries caused by the dog will slow down your escape. The game is played in real time, has excellent graphics and is very exciting. A new house is generated each time the game is played.

CORRIDORS OF DOOM! A dungeons & dragons type game that is very addictive. You can never win this game by chance. A lot depends on discovering the secrets of just how you have to deal with each individual monster in the game. There is a liquid which will destroy the Were-Wolf — but which one? How can you tame the giant spider? Will you ever learn the secret of how to defeat the Blood Devil? All of the monsters have treasures for those who are both brave and wise enough to overcome them, but to escape alive you must first cross some very nasty pits. Play it again and again.

AMAZING 3D MAZES: Wander through the giant 18 × 18 × 18 mazes collecting treasures, you know where they are, but how do you get to them? Extra points are awarded for finding the shortest routes. Don't get too frustrated by apparent dead ends.

3D NOUGHTS & CROSSES: Played inside a 4 × 4 × 4 cube, this is a game for the intellectual. Great graphics. It plays a mean game and wins about nine out of every ten games it plays.

TOWERS OF HANOI: You will welcome this classical puzzle which is a must for anyone with a computer. The problem difficulty depends on how many disks you use. It might only take you a few minutes with four disks, but with all nine it could take all day. Two variations of the game are included. There is a constant display of Hours, Minutes and Seconds, so that you know how well or how badly you are doing at any particular stage. If you find you cannot work the problem out! The computer will show you the shortest possible solution.

THE VAULT: A high security vault in Oxford. The game can be changed to centre around your own home town) has ten doors, each with its own five figure combination. The combinations of the nine inner doors are known, but only the manager knows the combination of the outer door. Unfortunately the manager has got himself locked in the Vault. It is your job to get him out before all the Oxygen is used up. The computer will give you metaphorical clues as to how near you are getting. The time switches which change the combination every so often can prove a problem. This is a case which really puts your powers of logic to the test.

POPULATION SIMULATION: This is a game for two players, each becoming the leader of one of the planets 'Techno' and 'Primo'. It is a battle to survive. Each decade a player must decide various things in governing his planet, he must carefully balance production and technology against consumption and population. He can either negotiate with his opponent or declare war on him. How about sending out an exploration party in search of new wealth. Only the experienced last very long.

TIME WARRIOR: You are an experienced time warrior and you have been sent on a mission to rid the Universe of imposters who have taken up key positions in ten different time sectors. In this adventure you will face the gladiators in Ancient Rome, find yourself in a gun fight in Old America, help Hillary climb Everest, joust with the Black Knight. It's all to be done in 'Time Warrior'.

The full cassette of 25 programmes is sent to you for only £8.95 inclusive.

Please feel free to write or phone for details of other programmes.

Trade Enquires welcomed

Telephone John Wilson on 0608 3059

25 SUPERB GAMES ONLY £8.95!

SPARTAN SOFTWARE

(DEPT. SU)
9 Cotswold Terrace,
Chipping Norton, Oxon.

DELTA RESEARCH LIMITED
15 Church Street, Basingstoke, Hants RG21 1QG Tx: 847054
Tel: Basingstoke (0256) 69345

UPGRADE YOUR SPECTRUM TO 48k

Spectrum 1 £37 SS32A

Spectrum 2 £31 SS32B

including FREE DELTA CHIPCHEK* CASSETTE worth £3.50

EASY TO FIT – COMPLETELY ENCLOSED IN THE SPECTRUM CASE

DELTA RAM kits utilise components from the world's leading supplier, are engineered to provide reliable operation and are supported by the DELTA CHIPCHEK*; a Memory Diagnostic Cassette provided Free with each kit giving computer standard testing of the existing 16k RAM and the 32k extension, searching tests for each RAM location and refresh operation. CHIPCHEK* is suitable for all Spectrums, 16k and 48k and brings your operating up to professional standards.

BEFORE ORDERING PLEASE CHECK THE ISSUE NUMBER INSIDE ON THE CIRCUIT BOARD AND WHETHER OR NOT INTEGRATED CIRCUIT 26 IS FITTED.

* My Spectrum is issue 1/issue 2
Integrated Circuit 26 is /is not fitted

Please supply RAM Kit No. SS32A/SS32B £37 / £31
+CHIPCHEK® Diagnostic Tape DTS5 FREE
CHIPCHEK® Diagnostic Tape DTS5 £3.50 *delete as applicable.

Name .....

Address .....

..... Postcode .....

Access Number

Prices include p & p and VAT. Make cheques payable to Servodata Ltd.

BIGGER ★ BETTER

Buffer

MICRO SHOP

ZX81 • ZX SPECTRUM •

DRAGON 32 • VIC-20 • BBC

The very best mail order items available "over the counter"

Games, Keyboards, Serious Programs, Rams, Books, Peripherals and much, much more!

FAST MAIL ORDER SERVICE PHONE **01-769 2887**
WITH ACCESS/VISA (24hr Ansafone)
or send large S.A.E. for catalogue (state which computer)

Open 10.30 — 5.30 Tues. to Sat. (closed Mondays)
310 STREATHAM HIGH ROAD, LONDON SW16

TASWORD TWO THE WORD PROCESSOR

48K SPECTRUM

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!

TASWORD TWO The Word Processor

Your Spectrum becomes a **professional** word processor with TASWORD TWO. TASWORD TWO gives you an amazing **64 characters per line** on your screen. This is ideal for standard A4 paper and TASWORD TWO prints your text just as it appears on your screen.

Tasword Two drives the following interfaces:
Euroelectronics Interface (ZX Lprint)
Hilderbay Interface
Kempston Interface

The same program drives these interfaces. A short easy to follow set of instructions takes you through setting up your Tasword Two to drive the interface you have or choose to buy. These instructions may include additional interfaces by publication date. Send s.a.e. for details, or order demonstration cassette. Tasword Two does drive the ZX printer.

£13·90 fully inclusive mail order price.

TASWORD TWO £2 Demonstration Cassette

See for yourself the powerful features of TASWORD TWO. Send just £2 for the Tasword Two demonstration cassette. A voucher is included which gives you £1 off the price of TASWORD TWO.

TASMAN SOFTWARE

Dept SU

17 HARTLEY CRESCENT LEEDS LS6 2LL

TASWORD The Word Processor

"This package is definitely value for money."
Educational Computing, April 1983

The first real word processor for the Spectrum and still great value for money. Thirty two characters per line make it ideal for use with the ZX printer.

£7·95 fully inclusive mail order price.

TASWORD £1 Demonstration Cassette

Send just £1 for the demonstration cassette and a voucher giving you 50p off the price of TASWORD.

ZX81 TASWORD

"Very good value and great fun to use."
"Unreservedly recommended." Popular Computing Weekly 19/8/82

No demonstration cassette available but send 50p (refundable against your subsequent purchase of ZX81 TASWORD) for a copy of the manual.

£6·50 fully inclusive mail order price.

TASWORD TUTOR

"an eloquent demonstration of Tasword's uses"

Every TASWORD program comes complete with a manual and a cassette. The cassette contains your TASWORD **and** TASWORD TUTOR. This teaches you word processing using TASWORD. Whether you have serious applications or simply want to learn about word processing TASWORD and TASWORD TUTOR make it easy and enjoyable.

Dilwyn Jones explains the workings of system variables

Sorting through memory for some useful addresses

SYSTEM VARIABLES are the bytes in memory from address 16384 to address 16508 in RAM on the ZX-81. They are used by the computer to remember certain things about its workings, such as where to print next.

You can make use of some of them in your programs either by reading their value — PEEKing — or replacing them with new values — POKEing — so as to use the information they contain or make the computer do something it might not otherwise do.

Not all of them can be used in this way; some may ignore you, whereas changing the contents of some of them may cause strange effects, like making a mess of the screen display. At worst, a little nasty known as a crash may be caused.

● **16384 ERR-NR (Error report number).** The value contained in address 16384 determines the report code. If you POKE a number into 16384 which is anything other than 255, the program will stop and display an error code, which may be non-standard but meaningful in some way.

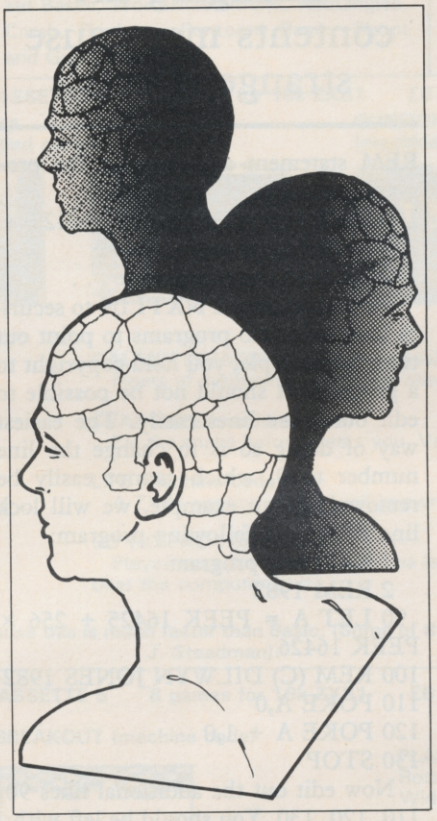
For example, if you wanted to arrange that if the user entered an incorrect value the program stopped with error U — standing for USER ERROR — you would arrange that POKE 16384,29 was executed. To determine which value to POKE, remember that 16384 has a value of 1 less than the report code.

The error report code can be suppressed by POKEing certain values into this system variable. That may be useful at exhibitions, where a report code may be an unsightly distraction from the rest of a display. Experiment with POKEing some of these numbers into 16384: 43, 70, 72, 73, 74, 75, 76, 77, 79, 81, 82, 89.

● **16386/7 ERR-SP.** This system variable contains the address of the first item on the machine stack after the GOSUB returns. With PEEKing this two-byte system variable you can check how many GOSUB return addresses are present on the stack, for example to check if any bug in your program had been causing it repeatedly to call and jump out of subroutines. Here is how to check:

PRINT (PEEK 16388 + 256 × PEEK 16389) — (PEEK 16386 + 256 × PEEK 16387)

● **16388/9 RAMTOP.** RAMTOP is the address of the first byte of memory



above that used by Basic. NEW operates only this far, so anything placed above RAMTOP is safe from every Basic function except POKE — that is how you would put it there. That makes it ideal for storing machine code or data you want to pass between two programs, so that it is not lost when you execute normally-destructive commands like LOAD or NEW. On a 1K ZX-81, 16388/9 have the values 16388 0 16389 68.

Using the formula from chapter 28 of the ZX-81 manual, 0 + 256 × 68 is 17408. That is the normal address of RAMTOP in a 1K ZX-81. If you have a RAM pack plugged in and wish to see if a program you have would fit into 1K, it may be tested by POKEing the foregoing values into RAMTOP, then entering the command PRINT USR 1040. The machine will behave like a 1K ZX-81.

The value contained in RAMTOP also determines how the display file — screen picture — is made up after CLS. If the value in RAMTOP is less than 19712 — 16388 = 0, 16389 = 77 — the display file is contracted to minimum size consisting of only 25 NEWLINE characters. If RAMTOP is 19712 or higher, the display file is expanded by filling with spaces. A contracted display file has the advantage that it takes five seconds less to LOAD or SAVE programs.

● **16391/2 PPC.** Contains the line number of the statement being executed. It could be used as an aid to debugging a program which has computed GOTOs/GOSUBs all over the place; a few PRINT PEEK 16391 + 256 × PEEK 16392 statements here and there could determine whether or not the program went where you thought it should do.

In the last line of a program it determines the line number to be printed by the report, e.g., 0/100. You may like to use that to print a score on the screen at the end of a game.

● **16396/7 D-FILE.** Contains the address of the start of the display file. The character pointed to is the first NEWLINE character in the display file. Since the display file floats above the program in memory, you can use it to tell you where the program ends, giving you an indication of the length of the Basic program, since the Basic program starts at 16509: PRINT PEEK 16396 + 256 × PEEK 16397 - 16509 will tell you the length of the program in bytes.

If you want to PEEK/POKE into the display file for any reason, this system variable helps you by telling you where in memory it starts.

● **16398/9 DF-CC.** Tells you where in memory the current PRINT position lies. PEEK 16398 + 256 × PEEK

16399 gives the address in RAM of the current PRINT position. That could be POKEd to change the PRINT position. Alternatively, if you PEEKed the address of the PRINT position, you would obtain the CODE of the character already at that position — useful for detecting collisions and so on in games, or for programs which require a screen cursor to be highlighted in inverse video such as word processors:

LET AS = CHRS (PEEK (PEEK 16398 + 256 × PEEK 16399))

IF AS >="A" AND AS<="Z" then print at Y, X; CHRS (CODE AS + 128)

The statement PRINT AT Y,X; moves the cursor without printing.

● **16400/1 VARS.** This pair of system variables enables you to find the address of the start of the variables area if you want to go PEEKing or POKEing around, or the end of the display file if you want to work backwards to POKE characters on to the bottom two lines of the display which cannot normally be PRINTed upon.

● **16404/5 E-LINE.** Contains the address of the end of the variables area. We can examine it to give a rough idea of how much memory we have used, including system variables, program, display and variables:

PRINT PEEK 16404 + 256 × PEEK 16405 - 16384

● **16412/3 STKEND.** Contains the address of the top end of the calculator, immediately below spare memory. Used in conjunction with ERR-SP 16386/7, we can obtain an approximate idea of how much memory we have left in which to work. PRINT (PEEK 16386 — PEEK 16412) + 256 × (PEEK 16387 - PEEK 16413) The figure is in bytes.

● **16417 not used.** This system variable is not used but is available to the user; you could use it to store information in the form of an integer from 0 to 255. That would be saved on tape when the program is saved.

● **16418 DF-SZ.** Define screen size, or the number of lines in the lower part of the screen. If you POKE a value of 1 or 0 into this system variable you can use lines 22 and 23, so that PRINT AT 22,0; and PRINT AT 23,0; become acceptable statements. If using INPUT or SCROLL, you should restore the original value, normally 2, or you may cause a crash. Conversely, if you are short of memory and using a SCROLLing display, you can make scrolling start from further up the screen by POKEing a value greater than 2 into 16418, a Basic part screen scroll.

● **16419/20 S-TOP.** This contains the number of the top line in automatic listings. Automatic listings are those produced when you press NEWLINE. It can be annoying when you are trying to work on one part of a listing and the computer insists on displaying a different part.

To place any line number you want, say line X, at the top of auto listings you must first move the cursor to a line number greater than the one you want at the top. Then enter the commands:

POKE 16419,X — INT(X/256) × 256

POKE 16420,INT(X/256)

● **16425/6 NXTLIN.** The address of the start of the next program line. You could use it to run machine code in a REM statement anywhere in the program, e.g.:

100 LET A = USR (PEEK 16425 + 256 × PEEK 16426 + 5)

101 REM . . . machine code . . .

Or you could use NXTLIN to security lock lines into programs to point out that, for example, you hold copyright to a program. It should not be possible to edit out those lines easily. The easiest way of doing so is to change the line number to 0, which cannot easily be removed. As an example, we will lock line 100 in the following program:

```
  1 REM any program
  2 REM 1982
 90 LET A = PEEK 16425 + 256 ×
PEEK 16426
100 REM (C) DILWYN JONES 1982
110 POKE A,0
120 POKE A + 1,0
130 STOP
```

Now edit out the additional lines 90, 110, 120, 130. You should be left with:

```
1 REM any program
2 REM 1982
0 REM (C) DILWYN JONES 1982
```

Note that the lines are not necessarily in the correct order but that will not affect listings or the running of the program.

> 'Changing the contents may cause strange effects'

● **16436/7 Frames.** This is a frame counter which counts the frames of a picture sent to a TV set. It is incremented 50 times a second and can be used for timing with a range of about 11 minutes before repeating. To set the timer initially we use:

POKE 16437,255

POKE 16436,255

They may be entered as direct commands or used as program statements, although of more use within programs because of the limited timing range. The values of the frame counter start at 65535 and count down to 32768, because bit 15 is normally 1. Once it has been re-set, its value is read like this to give a value in seconds: LET TIME=(65535-PEEK 16436-256*PEEK 16437)/50

The variable TIME then contains the time elapsed in seconds since the frame counter was re-set.

Remember that PAUSE uses the frame counter, so you cannot be timing and use PAUSE, too. If you want a delay while using the frame counter for timing, use a FOR/NEXT loop of about 1 to 60 for every second of delay. Remember also that bit 15 should always be 1 when timing. If both bytes of the frame counter reach zero, the program will crash.

● **16441/2 S-POSN.** After you use PRINT at Y,X; where Y and X are print co-ordinates:

PEEK 16441 would be 33-X

PEEK 16442 would be 24-Y

16441 contains information as to the PRINT column number but it is not very easy to use. If X is 0 — the PRINT position is somewhere on the left-hand side of the screen — the value of 16441 starts at 33 and decrements by 1 for every column across the screen. The value of 16442 starts at 24 if the PRINT position is at the top of the screen and decrements by one for every line moved down the screen; 16441 may be used in programs which handle text.

It may be necessary to determine whether there is room for a word on the current line or if it is necessary to move to a new line to prevent the word being chopped in two. Suppose the word to be printed was A$. To prevent A$ being chopped in half you could use:

IF PEEK 16441<LEN A$+1 THEN PRINT

always assuming, of course, that the previous PRINT item ended in a semicolon or comma. It may help to think of 16441 as the number of characters+1 which can still be printed on this line of the screen.

● **16444 to 16476 printer buffer.** If the printer is not used, may be used to store information if you have nowhere else to put it.

● **16507/8 not used.** These two unused system variables can be used by the programmer to store integers if needed. They are saved on tape along with the program.

ORWIN SOFTWARE: ZX81 CASSETTES

THE BEST SOFTWARE (BY VARIOUS AUTHORS) AT LOW PRICES

"Michael Orwin has built a reputation for value-for-money software and his Cassette 4 offers quantity as well as quality."

Sinclair User, October '82

"If each game was on a separate tape and selling for £5 each I would still recommend them. But all on one for £5 . . . ! This sort of value for money just has not been seen before on any personal computer."

"Without sounding pushy I would like to conclude this review by saying — if you have a ZX-81 and like games, then you should buy Michael Orwin's cassette 4."

2 extracts from *ZX Computing,* Oct/Nov '82

"Eight games, including an excellent version of the Scramble arcade game . . . Easy to operate, graphically impressive and good value for money."

The Times, Saturday 11th December 1982 (about Cassette 4)

CASSETTE 1 **£3.80**
(eleven 1k programs)

Machine code:

React, invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.

Basic:

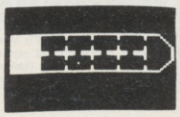
I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k

CASSETTE 2 **£5**

Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.

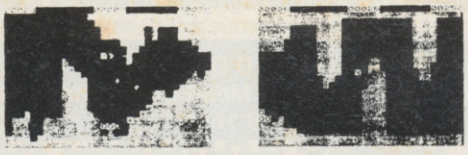
CASSETTE 3 **£5**
8 programs for 16k ZX81
STARSHIP TROJAN



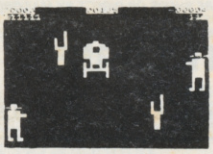
Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.
STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photon torpedo tracking.
PRINCESS OF KRAAL An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txip qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.

CASSETTE 4 **8 games for 16k ZX81** **£6**

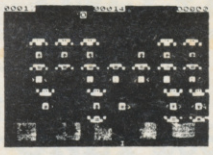
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.

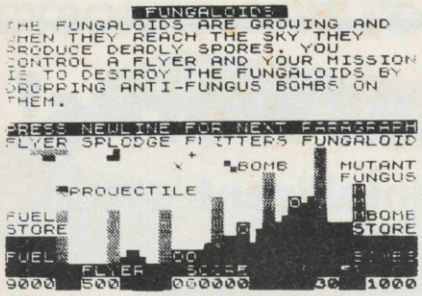


GUNFIGHT
(machine code)



INVADERS
(machine code)





GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.

SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).

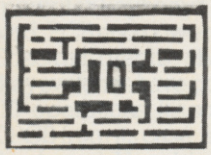
LIFE (machine code)
A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)
Played on a 4 × 4 × 4 board, this is a game for the brain. It is very hard to beat the computer at it.

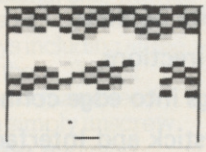
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available form J. Steadman).

CASSETTE 5 **8 games for 16k ZX81** **£6**

BYTE-MAN (machine code)
(previously available from Mindseye)



BREAKOUT (machine code)



SPACE RESCUE (machine code)
(previously available from Mindseye)

BLITZ (machine code)

PLANETOIDS (machine code)
Rotate, move, fire and hyperspace controls. Wide range of choice of speed and difficulty.

DODGEMS (machine code)
Dodge the computer's car while eating the dots.

DRAUGHTS (machine code)
Three skill levels.

MERCHANT (Basic)
Make your fortune on trading voyages in the Mediterranean and beyond.

7 of the 8 games are in machine code because it is much faster than Basic.

Please make cheques payable to ORWIN SOFTWARE. Recorded on high quality cassettes, sent by first class post from:
ORWIN SOFTWARE, Dept. OSU, 26 Brownlow Road, Willesden, London NW10 9QL.
ZX81 & SPECTRUM SOFTWARE WANTED

LOTHLORIEN

WARMASTERS

NEW FOR SPECTRUM 48K

JOHNNY REB

This full-graphics wargame, for 1 or 2 players is set during the American Civil War and is played entirely on a graphics battlefield which is generated slightly differently each game. Each side selects its force of infantry, cavalry and artillery with which it must capture the enemy's flag. You have full keyboard command of all movement and fire controls. A "Save Game" facility allows a partly played game to be reloaded to test different tactics!
PLAY THE COMPUTER OR CHALLENGE A FRIEND.
48K SPECTRUM **£5.50**

REDWEED

Can you save London from the MARTIANS? 3 powerful Martian war machines are advancing on London whilst semi-sentient REDWEED threatens to immobolise all your fighting units as it grows across the map. The game is played on a graphics battlefield on which you have full cursor control to move your tanks, flamethrowers etc. 15 levels of play will test your tactical abilities.
AVAILABLE FOR 48K SPECTRUM **£5.50**

WARLORD

Our best Dragon 32 title is now available for the 48K SPECTRUM. The game is a mixture of text and graphics in which you must rule your village whilst meeting attacks from the armies and Samurai of other Warlords, and must make raids to caputre slaves and gold with which you can hire mercenaries. Just to keep life interesting you will also have to contend with PIRATES who may raid your shipping. At the least sign of any weakness or disaster your own Samurai are liable to challenge you to personal combat for leadership of the village. Will you survive long enough to conquer all your enemies?
The game features a full colour graphics map plus full supporting graphics for all battle, combat and pirate engagements.
AVAILABLE FOR 48K SPECTRUM £5.50 & 16K ZX-81 (no graphics) £4.50

OTHER TITLES

ROMAN EMPIRE our best selling wargame **SPECTRUM 16K £5.50**
ZX-81 16K £4.50

TYRANT of ATHENS our original adventure wargame, **SPECTRUM 16K £5.50**
ZX-81 16K £4.50

SAMURAI WARRIOR adventure game in feudal Japan, **SPECTRUM 16K £5.50**
ZX-81 16K £4.50

PELOPONNESIAN WAR wargame of diplomacy and tactics **ZX-81 16K only, £4.50**

PRIVATEER graphic game to intercept and sink French ships at the time of Nelson. Cassette contains both a **16K ZX-81 & 48K SPECTRUM version for only £4.50**

AVAILABLE FROM BETTER SOFTWARE SHOPS OR DIRECT BY MAILORDER ACCESS NUMBER, CHEQUES OR POSTAL ORDERS PLEASE, PAYABLE TO:

M. C. LOTHLORIEN

DEPT S6, 4 GRANBY ROAD,
CHEADLE HULME, CHESHIRE, SK8 6LS

TRANSFORM LTD.

ZX Business Software.

FOR SMALL BUSINESSES AND THE SELFEMPLOYED

BUSINESS BANK ACCOUNT: this program enables you to make debits under 11-15 subheadings. Statements include totals of all subheadings.
ZX81 **£8.75** ZX SPECTRUM 48K **£10.75**

SALES DAY BOOK: for all your invoices this program will enable you to prepare statements of outstanding invoices. Program will also calculate VAT.
ZX81 **£8.75** ZX SPECTRUM 48K **£10.75**

PURCHASE DAY BOOK: keeps a complete record of all your purchases under 11-15 subheadings. This program will also calculate and deduct VAT.
ZX81 **£8.75** ZX SPECTRUM 48K **£10.75**

● All the programs have full search facilities ●

BUSINESS PACKS: including Bank Account, Sales, Purchase and, Quarterly Analysis programs.
ZX81 **£25.00** ZX SPECTRUM 48K **£30.00**

★ NEW ★

STOCK CONTROL: handles 900 lines, includes details of supplier. Program has full search facilities enabling you to search and update all lines from one supplier.

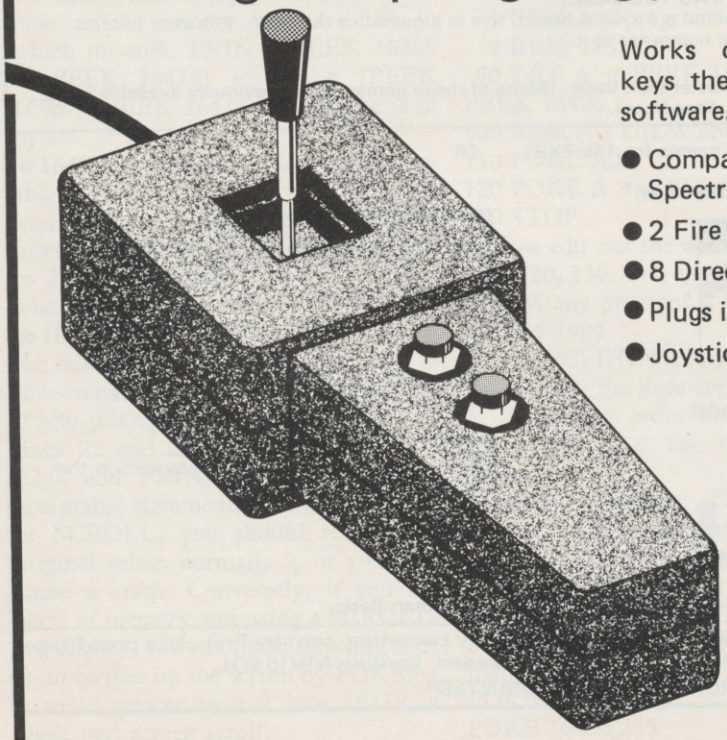
ZX SPECTRUM 48K £10.75

Please specify memory size when ordering for your ZX81 or ZX SPECTRUM
All prices include VAT post and packaging, for details send SAE to:

TRANSFORM LTD Dept. SU2
41 Keats House, Porchester Mead Beckenham, Kent.
Tel: 01-658 1661.

At last! A joystick that works!

Cambridge Computing bring you the first **intelligent** joystick.



Works on all existing software – regardless of which keys the program uses. No need for specially written software. Features include:

- Compatible with:
  Spectrum, ZX81, Jupiter Ace
- 2 Fire buttons
- 8 Directions
- Plugs into edge connector
- Joystick and Interface £26.00

Name .....

Address .....

.....

Please send me.....joysticks @ £26.00 for the Spectrum ☐ ZX81 ☐ Jupiter Ace ☐

Cheques and P.O.s made payable to:
Cambridge Computing,
1 Benson Street, Cambridge CB4 3QJ.

Dealer enquiries welcome please ring C P Lloyd on Cambridge (0223) 522905

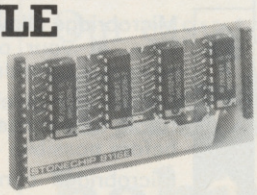
SPECTRUM AND ZX81 HARDWARE

PANDA

The famous Panda Expandable Ram Pack. Massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in rugged no-wobble design, rugged, injection moulded case, contoured to fit the ZX81 snuggly. Compatible with other add-ons (printer etc). LED on/off indicator. No additional power needed just plug in an go. British designed and made from top quality components throughout, guaranteed 12 months.

ONLY £19·95

EXPANSION MODULE



The 16K 'Panda' is easily expanded from 16K to 32K by adding this expansion module as and when you need it.

ONLY £14·50

GIANT PANDA

Giant Panda the two together. Buy the Panda and the Expansion Module at the same time for a gigantic 32K bytes and save.
Complete at a special price of **ONLY £34·00**

PROFESSIONAL CASED KEYBOARD TYPE FD42

FOR ZX81 OR SPECTRUM

This famous, best selling product immediately converts your ZX Computer into a sturdy, attractive and professional unit, with full size typewriter keyboard. A tough plastic case encloses the keyboard, PCB and power supply. It has 42 keys including all the ZX81/Spectrum graphic characters printed on them. The full travel key switches have gold plated contacts and guaranteed life of 10^6 operations. It's so easy to install! You simply unscrew the ZX PCB from its case, screw it to the FD case, and plug in the keyboard. No soldering or technical knowledge required.

ONLY £29·00

TYPE FDS FOR ZX81 OR SPECTRUM

Our new advanced keyboard has the same, fine specifications as the FD42 system, but with a new re-designed case, space bar and double-sized shift and enter keys. A must for the discerning ZX81 or Spectrum user.

ONLY £39·95

ZX KLIK – KEYBOARD

If, like many ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'Klik-Keyboard'. This is a simply fitted genuine push button keyboard which has been designed as an exact replacement for, and is no larger than, the existing keypad. ■ Fits on to the ZX81. ■ Full 40 keys plus one spare for any purpose. ■ No soldering – just plug in. ■ No trailing wires. ■ Clear permanent two colour legends. ■ Positive feel and sound as data is entered. ■ Speeds up programming enormously and reduces errors. ■ Fitting service offered £2·00 extra (remember to send your ZX81).

ONLY £24·50

THE SOUND EXPANDER

A superb economical addition to your ZX Spectrum. Clear, dynamic sound effects will really enhance your enjoyment of the new exciting programs available for the Spectrum. Our new sound amplifier comes complete with leads, volume control and built-in loudspeaker. Simply plug into the mic input, it fits neatly on to the back of the Spectrum.

ONLY £7·50

STOP PRESS

16K Spectrum owners – upgrade to 48K with a Spectrum Upgrade Pack complete with full instructions. No soldering.

ONLY £35·00

COMING SOON!

Our range of products is constantly under development and review. We have selected products from leading manufacturers in the UK and believe these represent the best value and quality combination on the market today.

PRODUCTS ARE STOCKED AND USUALLY DESPATCHED WITHIN 10 DAYS.

I wish to order the following:

Quantity	Item	Amount
	Panda @ £19·95 inc.	
	Expansion Module @ £14·50 inc.	
	Giant Panda @ £34·00 inc.	
	FD 42 Keyboard ZX/Spectrum* @ £29·00 inc.	
	FDS Keyboard ZX/Spectrum* @ £39·95 inc.	
	ZX Klik-Keyboard @ £26·50 inc.	
	Sound Expander @ £7·50 inc.	
	Spectrum Upgrade Pack @ £35·00 inc.	
	TOTAL	

All prices include VAT and post and packaging. All items include a full year guarantee. Products are stocked and usually despatched within 10 days. Overseas customers add £4 post and packing. Cheques/Postal Orders etc. should be made payable to AFDEC Electronics Ltd.

Card No. | | | | | | | | | | | | | | | | |

Signature _____ DINERS CLUB INTERNATIONAL

Name _____

Address _____

SU7

AFDEC ELECTRONICS LTD 318 Kempshott Lane Basingstoke Hants RG22 5LT

Sherston Software

Sherston Software offer a range of educational programs designed by primary school teachers and written by professional programmers. It is our policy to produce high quality programs at reasonable prices.

Reading Programs

Short Vowel Sounds: *BBC Model B and Spectrum 48K*

A very comprehensive program to practice short vowel sounds using simple words and pictures. Options include diagnostic, practice and final assessment modes. The speed, number of retries and weighting on particular vowels can all be altered. Nicely presented with graphics and sound effects. **£7.00.**

Word Builder: *BBC Model B*

Word Builder builds up words exactly as children should and shows the sequence on the screen for the children to sound out and read at their own speed. Includes sections on initial consonants and short vowel sounds, consonant blends and digraphs, double consonants and vowel-consonant digraphs. Presented in large, colourful, lower case letters. **£4.00.**

Maths

Maths Snap: *BBC Model B*

A 'game' for 1, 2, 3 or 4 players to practice number bonds. Options include addition, subtraction (or both), multiplication and division (or both) all at five levels of difficulty. The time allowed and number of questions per game can both be altered making it suitable for all ability levels. Children love it! **£6.00.**

All programs have been thoroughly tested in the classroom and are accompanied by full explanatory notes. We trust our customers not to break the copyright laws. If you are not satisfied with our product, return it within seven days and get your money back.

Orders to Sherston Software, 1 Noble Street, Sherston, Malmesbury, Wilts SN16 0NC. Cheques or P/O's payable to Sherston Software. Allow 28 days for delivery.

All software not currently available on the Spectrum soon will be!

GRAND SLAM

NOW PLAY BRIDGE ON YOUR OWN WITH MICROBRIDGE

THE PERFECT TUTOR FOR IMPROVING BRIDGE PLAY.
PRAISED BY EXPERTS AS THE IDEAL COMPANION FOR BEGINNERS AND ADVANCED PLAYERS.

Microbridge allows you to play Contracts all the time, at your own pace, in your own way, against a formidable defence.

Microbridge gives you an infinite variety of Contracts to practise your card play, in a way never before possible.

Microbridge contains special features to help you analyse your play as it progresses.

Microbridge does not get upset or lose its temper! It develops your confidence and skill in a remarkable way.

PLEASE SEND ME YOUR MICROBRIDGE CASSETTE FOR THE SPECTRUM 48K

NAME _____

ADDRESS _____

I ENCLOSE MY CHEQUE/P.O. FOR £7.99 PAYABLE TO 'STELLAR SOFTWARE' 144, PAMPISFORD RD, SOUTH CROYDON, SURREY CR2 6DA

CP Software — Spectrum Software

Specialists in high quality, intelligent games

NOW for the **JUPITER ACE** **Superchess II** **£11.95**

ORIGINAL SUPERCHESS
10 levels of play, plus many features
16k ZX81 £4.95
48k Spectrum £4.95

NOW
16k SUPERCHESS £6.95
The best 16k Spectrum Chess program. 3 levels of play with playing strength similar to the 48k version's first three levels. Analyse mode, plays several openings e.g. Queens Gambit, Ruy Lopez, plus more features. Runs on 16k and 48k Spectrum.

Superchess II
THE BEST AT £7.95

- 7 levels of play
- Plays a variety of openings e.g. French Defense, Sicilian Defense, Ruy Lopez, Queen's Gambit etc.
- Self play mode
- Analyse mode
- Recommended move

For Sinclair 48K SPECTRUM

BACKGAMMON
Very popular
48k Spectrum £5.95

ZX DRAUGHTS
10 levels of play, very fast
48k Spectrum £5.95

SNAIL LOGO
An implementation of turtle style graphics. Regardless of age, SNAIL LOGO is an ideal way to explore the concepts of form and design and to learn the associated programming procedures, or just to have fun creating interesting patterns. SNAIL LOGO supports standard Logo commands, e.g. Procedures, Repeat, Parameters, Replace, it includes syntax checking and an editor plus other detail features.

SPECTRUM FORTH
FORTH – 10 times faster than Basic, much easier than machine code. If you want to discover the advantages of Forth or are already converted, Spectrum FORTH is the ideal package. It is cassette based and includes Spectrum Forth, a sample Forth program and comprehensive user documentation. It has all Forth structures and allows full use of the Spectrum's colour, hi-res graphics. Specify 16k or 48k when ordering.
16k version, about 114 new words can be defined **16k Spectrum £9.95**
48k version, about 1000 new words can be defined **48k Spectrum £9.95**

COLOSSAL CAVES
(Adventure 1 by Abersoft)
Enter the Colossal Cave, discover the treasure left by the wizard. On your travels you will meet dragons, snakes, trolls and other denizons of the underworld. Be warned, this adventure can be addictive. Includes a save facility so that the adventure can be continued from the point reached when saved.
48K Spectrum £6.95

SPECTRUM BRIDGE TUTOR
Improve your Bridge with Spectrum Bridge Tutor. Uses the Acol bidding system including Blackwood and Stayman conventions. Each of the 40 hands illustrates a particular aspect(s) of the bidding and play. Following the card play is an explanation of those aspects highlighted in the hand. The correct bid and play must be made in order to progress but a help feature is included.

For 16k and 48k Spectrum –
Beginners (40 hands) £5.95 Advanced (40 hands) £5.95

Speech from the Spectrum 48k
SOFTALK I 'Multiwords' 70 plus words £5.95
SOFTALK II 'Spacegames' 80 plus words £5.95

BEEPER AMPLIFIER
Plugs directly to the Spectrum's EAR or MIC socket. Battery powered (not supplied) **£5.95**
or SAVE £1 when ordered with any program
Please add 35p for p&p.

UK Prices include post & packing. Despatch within 48 hours of receipt of order. Send SAE for catalogue. Also available from WH Smith – Computer Branches

(For orders outside UK add 80p for postage).
Send cheque or postal order to: CP SOFTWARE, Dept. SU5, 17 Orchard Lane, Prestwood, Bucks. HP16 0NN

TOP RATES PAID FOR HIGH QUALITY PROGRAMS –
SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY.

GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.

Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 92

Starting from Scratch

continued from page 91

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is that important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

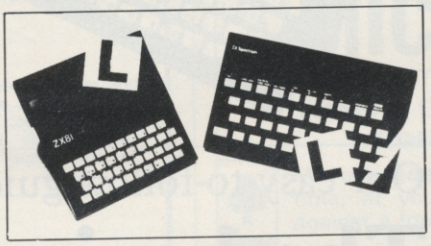
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD " " followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

SINCLAIR SIMON by ZAKK
HIYA! SIMON! WHAT YER DOING?
BESIDES RECOVERING FROM THE SHOCK ...NOTHING!
THWACK!
HAVE YOU READ ABOUT THE LATEST PRODUCTS WHICH ARE COMING AVAILABLE? THE MICRODRIVE AND THE MICRONET ADAPTOR!
YEH!
SPECTRUMLESS ISN'T GOOD FOR YOU!
SINCLAIR USER
HAS IT OCCURED TO YOU, THAT THE NUMBER OF THINGS YOU CAN GET TO ADD ONTO YOUR SPECTRUM ARE NOW SO MANY THAT THEY DWARF THE MACHINE?
YEH!
MY MISSUS IS ALWAYS NAGGING ME ABOUT THE SPACE I TAKE UP AND THE POWER I USE!
YEH! MINE TOO!
WHIRL!
THAT'S WHY I'M HAVING ALTERATIONS DONE!
EXTENSION PLANS
MEGAWATT METER

University Software

LIBRARY OF ADVANCED MATH/STAT/ECON

TAPE 1: MATRIX OPERATIONS — **SPECTRUM £6.95, ZX81 £5.95**

Side A: Inversion, multiplication, addition, subtraction and scalar multiplication of matrices and vectors within one single program. Any output can in turn be used as the input of the next operation without re-typing. Capacity: 16K ZX81: 25×25, 16K Spectrum: 17×17, 48K Spectrum: 48×48.
Side B: Determinants of square matrices.

TAPE 2: POLYNOMIALS — **SPECTRUM £6.95, ZX81 £5.95**

Side A: Includes quadratic equations (as degree 2 polynomials) and Newton-Raphson and half-interval search methods for higher degree polynomials. Computes the roots with 8 digits of precision.
Side B: You can plot polynomials in any interval and examine their roots, extremum points.

TAPE 3: INTEGRATION — **SPECTRUM £6.95, ZX81 £5.95**

Side A: Integration of functions by Simpson's and trapezoidal rules. Also computes the area enclosed by two functions.
Side B: Plot of integrals. Integration can be visualised on the screen.

TAPE 4: REGRESSION — **SPECTRUM £7.95, ZX81 £6.95**

Side A: A highly developed multivariate regression program featuring Log/Ln option on each variable (thus allowing exponential and geometric regressions), R^2, corrected R^2, standard errors, t-statistics, F-statistics, degrees of freedom, Durbin-Watson statistic, interpolation. Capacity (no of variables × no of observations); 16K ZX81: 2×500, 5×250, 10×140, 16K Spectrum: 2×220, 5×100, 10×50, 48K Spectrum: 2×1800, 5×900, 10×500.
Side B: Plot of bivariate regressions. You can see how your computer draws a best-fitting line on a set of numbered data points.

TAPE 5(a): LINEAR PROGRAMMING — **SPECTRUM £7.95, ZX81 £6.95**

Side A: A user friendly optimisation program capable of handling all sorts of linear programming problems (any combination of $<, =, >$, constraints and $x_i>$, $x_i<0$, $-\alpha < x_i < \alpha$ sign constraints). Features the cannonical equivalent of the primal, values of slack variables and the dual. Capacity (no of variables × no of constraints); 16K ZX81: 10×23, 15×20, 20×15, 16K Spectrum: 10×10, 48K Spectrum: 10×50, 25×40, 50×30.
Side B: Solutions of simultaneous equations.

TAPE 5(b): PROFESSIONAL LINEAR PROGRAMMING — **£14.95**

Available for 16K ZX81 and 48K Spectrum with above features plus 'save-data' and 'change-data' facilities. Any single data entry can be changed without re-typing the whole data.

- Cheques payable to:
  UNIVERSITY SOFTWARE
  29 St Peter's Street
  London N1 8J9
- All incl. prices for the UK.
- Tapes 1 – 5(a) Spectrum £35
  ZX81 £30

SOFTWARE LIBRARY

FOR

SPECTRUM

Low-cost weekly hire of Games, Adventures, Utilities and Business Programs.

We have a large selection of software, with licenses from leading software publishers.

- **Membership only £6 for 12 months.**
- **Program hiring from only 80p (plus 25p p&p).**
- **New titles constantly being added.**
- **All titles with publishers permission and royalties paid.**
- **Purchase software at discount prices.**
- **Return of post service.**

Join today by clipping the coupon below, or send S.A.E. for further details.

☐ YES, please send me my free catalogue and selection sheet. I enclose my £6 cheque/Postal Order.
☐ I enclose a S.A.E., please send further details.

NAME .....

ADDRESS .....

.....

..... TEL .....

Send to:

KERNOW SOFTWARE LIBRARY
(DEPT SU)
55 ELIOT DRIVE, ST GERMANS
SALTASH, CORNWALL PL12 5NL

How Good is your Spectrum

If you're interested in finding out what your Spectrum can really do then you must go beyond the limitations of BASIC. Now, mastering machine code can be a reality with CRYSTAL COMPUTING'S MACHINE CODE UTILITIES.

Alternatively, try our own range of exciting and original ZX games:

Zeus Z80 Assembler

If you own a 48K Spectrum and want to exploit the potential of your computer to the full then Zeus is the ideal introductory aid. There has never been an easier way to enter and modify your machine code programs.

For the beginner, Zeus is the perfect companion.

- Over 65,000 labels
- Auto-line numbering
- Full screen editor - simply move the cursor up into the program listing for instant word-processor style alterations, plus clearscreen, clearline, insert, delete, rubout and tab keys.
- List, search through, re-number and delete any section of the program listing.
- User Manual - with detailed explanations of assembler terminology and of all 24 commands.

For the experienced user, Zeus is simply the fastest and most flexible Z80 programming system available today. The high speed two pass assembler accepts all Z80 mnemonics and features:

- Tokenized text maintained separately from BASIC.
- The ultimate in error trapping with extensive report codes.
- Operators, expressions, directives and symbols.
- Up to 14 character alphanumeric labels and symbols.
- Hex, decimal or character constants.
- Tokenized report codes and comments.

The Zeus Z80 operating system - more than a piece of software - an investment:

- 9 invaluable monitor support facilities; including memory modify and a hex/decimal converter.
- Optional parallel output to ZX printer.

available NOW from Crystal Computing.

Spectrum Monitor & Disassembler

A superb memory editor, monitor and disassembler to enable easy entry, inspection and analysis of your machine code routines. Fast debugging is aided by breakpoint, register display, block print and tabulate, block copy, verify, a unique 'jump relative' calculator and a versatile 'find' command which displays all occurences of a specified set of bytes. Plus insert message, substitute, output to ZX printer and more. Accepts input in decimal or hex and there's even a command to convert between the two forms.

A machine code system designed as the perfect compliment to Zeus. Having both co-resident in memory turns your Spectrum into a truly comprehensive Z80 programming unit. Now you can explore the excellence of your computer and open up a whole new world of programming.

Each untility comes complete with user manual for just £8.95 each.

ZX-81 Superfast Load & Save

This utility has been designed to provide all the facilities you'll ever need. Our Monitor and Disassembler as available for the 16K ZX-81 also includes commands to LOAD and SAVE any block of memory (including BASIC programs) at up to FOUR TIMES normal speed... only £7.95.

COSMIC GUERILLA

Bring your Spectrum to life with the most infuriatingly difficult arcade style action around.

As commander of the earth's last line of defence, your task is to zap wave after wave of marauding alien attackers as they obliterate the protecting force field in an attempt to overrun your supply of ion laser cannons.

Four game variations, six levels of difficulty on each, full sound effects plus the smoothest three colour graphics you've ever seen for endless hours of action packed fun all for just £5.50.

The Dungeon Master

Let the 48K Spectrum be your guide into a new dimension in adventures with the first program to enter into the spirit of role playing games. Two programs on one cassette. The unique **DUNGEON CREATION PROGRAM** helps you build up your own complex scenarios simply and quickly.

Then, with the **DUNGEON MASTER**, create your character and battle your way through an infinity of fantasy worlds in search of treasure and glory.

Complete with detailed manual and sample 140 location dungeon. The only adventure you'll ever need to buy for just £7.50.

Merchant of Venus

Have you the skill and reflexes to control a leviathan space freighter from lift-off to touch-down? Have you the business head to trade successfully throughout the length and breadth of an entire planet? Find out by becoming a

Where a complex economic scenario is combined with a superb graphic simulation to produce an entirely new concept in real time adventure.

By studying the current market and wheeling and dealing in Cyborgs, Robodrones and much more, you must plan your business strategy.

But ultimately your success depends on your ability as a pilot, from lift-off as you thrust skyward, during flight as you control your ship's flight over mountains, cities and oceans, to landing where your descent is displayed in incredible graphic detail. A compelling game of skill and strategy for the 16K ZX81. £5.50.

ZX 81 Games Pack

- simply brilliant. Seriously recommended for 16K RAM pack owners (Interface 1 not required). Features 8 full screen, fast action graphics games all with on screen scoring. Invaders, Asteroids, Bomber and Super slalom, plus a challenging adventure, dungeon quest.

All 100% machine code to run on the unexpanded ZX81. Great value at £4.50.

Send us for our latest catalogue.

P & P included. Please make cheques/PO's payable to

Written any software? Send it to us for evaluation and details of our excellent royalties scheme.

dealer enquiries welcome.

Crystal

Crystal Computing
2 Ashton Way
East Herrington
Sunderland SR3 3RX

SIMPLE PLUG-IN

CENTRONICS INTERFACE

ONLY £45 inclusive

- Recognises LLIST and LPRINT which allows programs to be listed directly from your Spectrum
- Also allows printout direct from BASIC listings without the need for special user calls
- Completely self contained with 1 metre of ribbon cable and connectors
- Works with any Centronics printer including all Epsons, Seikosha 100A, OKI Microline 80 etc
- Includes driving software which allows up to 128 characters per line
- Full range of business software available
- Fully tested and guaranteed for 12 months

Trade Enquiries Welcome

KEMPSTON
MICRO ELECTRONICS
180a Bedford Road, Kempston, Bedford, MK42 8BL

I wish to order:

Quanity	Item	Price
	Centronics interface @ £45.00	
Cheques/Postal orders should be made payable to Kempston Micro Electronics Ltd	Post & Package	£1.00
	Total (VAT inc)	

For Access/Barclaycard please give your card number and signature

Card No

Signature

Address

Please post to Kempston (Micro) Electronics, Dept SU7 180a Bedford Road, Kempston, Bedford MK42 8BL

SPECTRUM & ZX-81 USER

YOU deserve a High Quality Keyboard for only £39.95
Ten good reasons why the MUKBUS keyboard represents a quality product for the amateur/professional user.

★ Full Size Space Bar
MUKBUS Mother Board Compatible ★
★ Colour Coded Keycap Legends
Shift Lock with L.E.D. ★
★ Cursor Pad
★ No Separate Power Supply Required ★
★ Fire Button
Future User Function Key Capacity ★
★ Automatic Delete Key
Positive Tactile Key Response ★

Send Cheque/PO to Microtext (UK) Ltd, 18–24 John Street, Luton, Beds, or ask for leaflet on our MUKBUS capability telephone 0582 418894.

Please state whether ZX-81 or Spectrum!

The Keyboard comes complete with all necessary cables and instructions. To fit, simply plug in (no soldering necessary) as well as offering easier operation it is completely compatible with existing software.

For an extra £9.50 you can buy the keyboard case.

BUSINESS USERS

SPECTRUM 48K
ACCOUNTS PREPARATION
Produces Prime Entry Listings, Nominal Ledger, Trial Balance, Profit and Loss Account and Balance Sheet with supporting schedules. 73 nominal ledger accounts and automatic VAT calculations.
Sole Trader/Partnership (Up to 4) £25.00
Limited Company £25.00
(Combined Price £35.00)

SALES AND PURCHASE LEDGERS
Produces day book, sales/purchases and VAT analyses, debtors/creditors listings and statements. 250 accounts and 1000 monthly transactions. Automatically calculates VAT. £25.00

ZX-81 16K
ACCOUNTS PREPARATION
31 nominal ledger accounts
Sole Trader £17.50
Limited Company £17.50
(Combined Price £25.00)

SALES AND PURCHASE LEDGERS
Produces day book, sales/purchase and VAT analyses, debtors/creditors listings, statements.
50 accounts and 200 monthly transactions.
Sales £20.00
Purchases £20.00
(Combined Price £25.00)

All programs have been professionally developed and are being used by practising accountants and small businesses. Supplied on cassette with operating instructions.

Full details:

HESTACREST LIMITED
P.O. Box 19, Leighton Buzzard, Beds. LU7 0DG
Tel. 052-523 785.

·ZX81 + ·ZX SPECTRUM· ·SOFTWARE··BOOKS·

also BBC Micro

Cambridge Computer Store

1 Emmanuel Street
Cambridge CB1 1NE
Telephone (0223) 358264/65334
(closed 12.30 – 1.15 except Saturday)

MICROSPHERE

MICROSPHERE COMPUTER SERVICES LTD
72 ROSEBERY ROAD · LONDON N10 2LA
TELEPHONE 01-883 9411

EVOLUTION (48K Spectrum)
Can you trace the course of evolution from the primordial soup to man, keeping a balanced world and surviving the odd disaster as you go ?
Should be easy. . . after all it's been done before!
Only **£6.95**

OMNICALC (48k Spectrum)
The best Spectrum spreadsheet you can buy. Written in machine code to be faster, to give you more space for data, and to allow more features to be included, it is guaranteed uncrashable.

"If more programs shared the quality of OMNICALC, then we might see more Spectrums in offices." Home Computing Weekley 3/5/83

"It is ideal for someone who has just found the spreadsheet concept, but it is also a very powerful tool for anyone who has used one previously."
Sinclair User June 1983
Complete with comprehensive manual **£9.95**

ZX-SIDEPRINT (Spectrum & ZX81 versions)
Use ZX-Sideprint to print sideways, giving you 80/132 etc. characters per line.
(State version reqd) **£4.95**

CREVASSE & HOTFOOT (any Spectrum)
Can you make it across the ice-cap whilst chasms open and close all around? Or, help the rabbit get to fields full of carrots – but remember! the plumper the rabbit, the greater the danger.
2 original games for only **£4.95**

New! **THE TRAIN GAME** (any Spectrum) **NEW!**
First there were model railways, then there were computers. Now Microsphere gives you both in one.
Featuring passenger, goods & express trains; tunnels; viaducts; points; stations; turntable bonus games; collisions; derailments; irate passengers; and everything else you expect from a major railway!
Two tract layouts on each cassette. Superb value for money.
Only **£5.95**

BARGAIN-HUNTERS READ *THIS!*

Whatever your model of Sinclair computer—you can get HOURS of fun, intellectual satisfaction and education for just 95p per month!

A bargain?
That's **Sinclair Programs** magazine—the fat, glossy magazine that's PACKED with original, tested programs for you to load and run.

With **Sinclair Programs** every month you can build the library of programs that suits your mood: in recent issues we have challenged our readers with programs to test their skill at Sharpshooter or Laser Cannon . . . jolt their brain cells with Quadratic Equation or Monster Maths . . . or take a practical turn with their own word processor program or graphic generator.

That is just a fraction of what you get from **Sinclair Programs**. Each month we have 40 programs for owners of ZX80s, ZX81s and Spectrums. But make sure you don't have to hunt TOO far for your bargains—**Sinclair Programs** always sells out quickly, so order yours TODAY from your newsagent, or fill in the form below and we will send it direct to you, every month.

Mail to: ECC Publications Limited, 30-31 Islington Green, London N1 8BJ Yes — I'd like to subscribe to **Sinclair Programs** (12 issues — price £13.20) I enclose a cheque for £ ___ Please charge my credit card: name ___ Number ___ Address ___ Name ___ Date ___ Signature ___

NB This offer applies to UK subscribers only. Overseas rates available on request.

Switching between complementary displays on the ZX-81

Queries on the way in which Sinclair machines use the screen continue to flood in. Andrew Hewson returns to the subject in his column this month with more routines for your programs

HAVING ANSWERED a number of questions about ZX-81 and Spectrum displays last month, I return to a similar theme. The first question is from Keith Ratcliffe of Stockport, who asks: **How can I switch rapidly between two different but complementary displays on my 16K ZX-81?**

As I explained last month, the display on the 16K ZX-81 occupies 793 bytes, starting at the address pointed to by the D-FILE system variable. Thus to save the current display and replace it by a new one it is necessary first to copy the current contents of the 793 bytes to a storage area, probably above RAMTOP, and then to copy the new display into place.

Table one shows a Basic program which demonstrates the principles of the procedure. It creates a display, copies it above RAMTOP, over-writes the display and then copies the original version back again. The loops in lines 10 to 50 and lines 210 to 250 are for demonstration purposes only.

Before using the program, RAMTOP must be re-set from its original value of 32768, which is the highest address available on the 16K ZX-81, to some lower figure so that the memory locations above it can be used to store the display information. The value of RAMTOP is determined by the contents of addresses 16388 and 16389 — see page 177 of ZX-81 Basic Programming.

The calculation used — all system addresses are calculated in an analogous fashion — is RAMTOP = Contents of 16388+256* Contents of 16389. Initially 16388 is set to 0 and 16389 is set to 128 because 0+256*128=32768.

The minimum requirement to store two complete pages is 793*2=1,586 bytes. That amount of space can be reserved, with some to spare, by entering POKE 16389,121.

Doing so re-sets RAMTOP to 0+256*121=30,976 and then entering NEW causes the ZX-81 to move the stack to take account of the new RAMTOP value.

The Basic program serves to demonstrate the technique but it is very slow and so I have given two machine code routines in table two, which together perform the same task. The routines both make use of LDIR, the machine code instruction for copying items from one area of memory to another.

The routines should be entered into a REM statement occupying the first line of a program starting at location 16516, using an assembler program or a simple hexadecimal loader such as:

```
10 REM AT LEAST 38 CHARACTERS
20 FOR I=16516 TO 16551
30 INPUT Z$
40 POKE I,16*CODE Z$+CODE Z$(2)-476
50 NEXT I
```

Before loading the routines, re-set RAMTOP and enter NEW as before.

Many display pages can be stored and recovered, provided RAMTOP is set low enough, using those routines. Their operation is controlled by the contents of locations 16514 and 16515, i.e., the first two locations of the REM statement. If the locations both contain zero the display is stored/recovered from the area immediately above RAMTOP. If the locations together contain 793 — the length of a single display page — 793 bytes is left between the RAMTOP and the beginning of the display storage.

The routine to store the display is located at 16516 and the recovery routine is at 16534. Thus, for example, to store and then recover a single page, enter:

```
POKE 16514,0
POKE 16515,0
```

continued on page 97

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

'Two simple machine code loops could be used to transfer the data in a similar manner to the loops in table two — a reader exercise'

continued from page 96

```
RAND USR 16516      (store the page)
RAND USR 16534      (recall the page)
```

Similarly to store a second page and recover the first enter:

```
POKE 16514,25       (793-256*INT (793/256))
POKE 16515,3        (INT (793/256))
RAND USR 16516
POKE 16514,0
POKE 16515,0
RAND USR 16534
```

Similar routines can be written for the Spectrum but it must be borne in mind that the Spectrum display file is very large — nearly 7K when the colour information in the attributes is included. There is just sufficient room in the 16K machine to store one extra page and a small program. With 48K of RAM there is sufficient room for six extra display pages.

Richard Mellor of Walsall poses a question which does not concern the display file but the solution involves saving information above RAMTOP in a similar manner to storing the display. He asks: **Is it possible, on the ZX-81, to load and save variables only from within a program so that they can be loaded-in at a later date and re-used?**

```
  10 FOR I=0 TO 21
  20 FOR J=32 to 63
  30 PRINT CHR$ J;
  40 NEXT J
  50 NEXT I
 100 LET D=PEEK 16396+256*PEEK
16397
 105 LET R=PEEK 16388+256*PEEK
16389
 110 FOR I=0 TO 792
 120 POKE R+I,PEEK (D+I)
 130 NEXT I
 200 PRINT AT 0,0;
 210 FOR I=0 TO 21
 220 FOR J=63 TO 32 STEP -1
 230 PRINT CHR$ J;
 240 NEXT J
 250 NEXT I
 300 FOR I=0 TO 792
 310 POKE D+I,PEEK (R+I)
 320 NEXT I
```

Table 1. A ZX-81 program to demonstrate how to save a display above RAMTOP and retrieve it again. Before using the program enter:

```
POKE 16389,121
NEW
```

The ZX-81 LOAD and SAVE routines transfer to and from cassette all the information between address 16384 and the address held in the system variable called STKEND. Inspection of the memory map on page 171 of ZX-81 Basic Programming shows that most of the active contents of memory — the system variables, the program, the display and the variables and the like — lie between 16384 and STKEND. Hence those items are transferred automatically by the LOAD and SAVE commands.

It is unfortunate that the starting address is fixed at 16384. If it was determined by the contents of an extra system variable it would be possible, by POKEing suitable values into the system variable, to LOAD or SAVE portions of memory as can be done on the Spectrum. An alternative would be to copy the SAVE and LOAD routines into RAM, alter them and then use the new routines instead of the originals.

A simpler solution is to copy the contents of the memory area which is required separately — in this case the variables area — above RAMTOP, SAVE the program, copy the variables back again and then SAVE them separately. The reverse procedure is used when LOADing the program and the variables.

Supposing a two-dimensional array P(5,23) is to be SAVEd separately from the program. The first task is to determine how much memory is required in the variables area, and therefore also above RAMTOP, to store the array. It is possible to calculate the space requirements using the information in chapter 27 of ZX-81 Basic Programming but it is probably easier to let the machine do the work for you. First clear the ZX-81 by entering NEW and define the array by entering:

```
DIM P(5,23)
```

Then calculate the length of the variables area by checking the value of the two systems variables VARS — which points to the beginning of the area — and E-LINE — which points to one more than the end of the variables area. The difference between E-LINE and VARS less one, i.e. PEEK 16404+256*PEEK 16405-1-PEEK 16400-256*PEEK 16401 is the length of the variables area and, as the array P is the only variable, it is also the length of P. In this case P proves to be 583 bytes long — five bytes for each of the 5*23=115 elements of the array plus another eight bytes to hold various ancillary information as shown on page 173 of the manual.

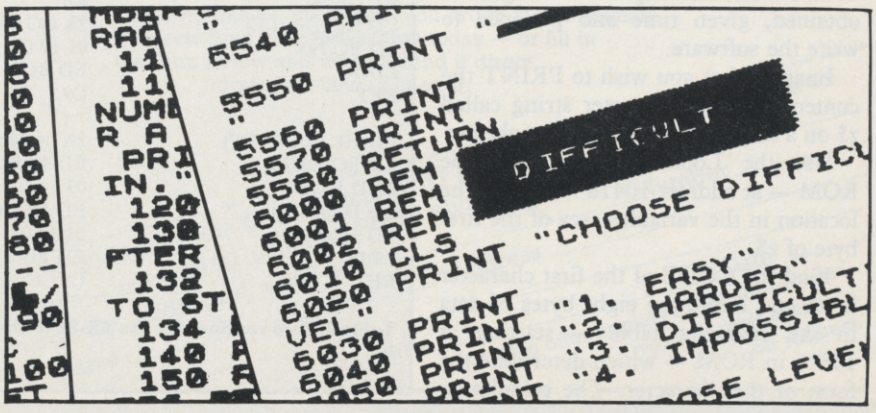
Thus at least 583 bytes of memory are required above RAMTOP to provide temporary storage for the array. Reducing the contents of 16389 from 128 to 125 reserves 3*256=768 bytes, hence enter POKE 16389,125 followed by NEW.

> 'Spectrum display file is nearly 7K when the colour information in the attributes is included'

The program can then be LOADed from cassette and the two routines listed in table three can be added to it. The two routines transfer the first 583 bytes of the variables area to and from the space above RAMTOP in much the same way as the display was transferred previously. There is one more requirement of the program. That is that the array must be the first variable declared by the program. That ensures that the array lies at the bottom of the variables area.

That final requirement makes it diffi-

continued on page 98



continued from page 97

cult to use the technique with ordinary string variables because they can move up the variables area when they are redefined by the program. It is therefore best to use the technique only with numeric variables, arrays and string arrays.

Two simple machine code loops could be used to transfer the data in a similar manner to the loops in table two. That is left as an exercise for the reader.

My next letter is from Ulrich Myska of Berlin. He writes: **The advertisement for the Spectrum states that software can be used to generate 40 characters per line or more. Is there a simple Basic program which can do this?**

Unfortunately there is not. The Spectrum character set is designed on an eight-by-eight matrix of pixels giving a maximum of 32 characters on each of 25 lines, because the resolution of the screen is 192 by 256 pixels. I explained the somewhat complicated format of the Spectrum display last month, so I shall restrict my comments to an outline of how 40 characters per line might be obtained, given time and patience to write the software.

```
100 REM STORE P(5,23) ABOVE
    RAMTOP
110 LET I=PEEK 16400+256*PEEK
    16401
120 LET J=PEEK 16388+256*PEEK
    16389
130 FOR K=0 TO 582
140 POKE J+K,PEEK(I+K)
150 NEXT K
200 REM RECALL P(5,23) FROM
    ABOVE RAMTOP
210 LET I=PEEK 16400+256*PEEK
    16401
220 LET J=PEEK 16388+256*PEEK
    16389
230 FOR K=0 TO 582
240 POKE I+K,PEEK(J+K)
250 NEXT K
```

Table 3. Two ZX-81 routines to store an array p(5,23) above RAMTOP and to retrieve it.

Imagine that you wish to PRINT the contents of a 40-character string called z$ on a single line. The steps might be:

Use the Lookvars routine in the ROM — at address 10418 — to find the location in the variables area of the first byte of z$.

Find the CODE of the first character in z$ and locate the eight bytes of data in the character table — starting at 15616 in ROM — which determine the form of the character. The calculation is: Address of first byte= 15360+8*CODE(z$(1))

Store the contents of each of the eight bytes in the first, 33rd, 65th and the like bytes of the printer buffer starting at 23296. The printer buffer forms a useful temporary store and in this case it is exactly the correct length to store a single line of characters.

Find the CODE of the next character and the eight corresponding bytes in the character table as previously. Store the contents of the eight bytes in the second, 34th, 66th bytes of the printer buffer and then rotate each byte to the left by two bits. It is that procedure which will cause the characters to overlap so that 40 characters can be squeezed into the space normally used by 32. Repeat for the next character and rotate to the left by four bits.

You can see that the task is complicated but the difficulties do not end when all 40 characters have been transferred correctly to the printer buffer. Each line of 32 bytes must then be transferred to the correct position in the display file and, as I explained last month, that task is not straightforward.

Assembly code	Hexadecimal	Comment
		Store
LD HL,(RAMTOP)	2A 04 40	RAMTOP to HL
LD BC,(16514)	ED 4B 82 40	Offset to BC
ADD HL,BC	09	Add
EX DE,HL	EB	Destination to DE
LD HL,(D-FILE)	2A OC 40	Source to HL
LD BC,793	01 19 03	Length of display to BC
LDIR	ED BO	Block move DE to HL
RET	C9	End
		Recover
LD HL,(RAMTOP)	2A 04 40	RAMTOP to HL
LD BC,(16514)	ED 4B 82 40	Offset to BC
ADD HL,BC	09	Add
LD DE,(D-FILE)	ED 5B OC 40	Destination to DE
LD BC,793	01 19 03	Length of display to BC
LDIR	ED BO	Block move DE to HL
RET	C9	End

Table 2. Two routines for the ZX-81 to store a display page above RAMTOP and recover it.

Michael Boyd of Witham, Essex, wants to know how to write a program which can read two keys which have been pressed simultaneously. He writes: **I have tried using INKEYS but if two keys are pressed at the same time the result is zero, not the code of either key.**

The solution is to make use of the IN command as described in chapter 23 of the manual. There are eight versions of the command, each of which reads five of the 40 keys on the keyboard. The command returns a whole number between 224 and 225 inclusive, depending on which combination of five keys is pressed. For most programs it will be sufficient to test for each of the legitimate results in turn. The most efficient way is to use a routine similar to the following:

> 'The printer buffer forms a useful temporary store and in this case it is the correct length'

```
100 LET I=IN 65022
110 PRINT I;
120 IF I=2*INT (I/2) THEN PRINT "A";
130 IF I=4*INT (I/4)<2 THEN PRINT "S";
140 IF I=8*INT (I/8)<4 THEN PRINT "D";
150 IF I=16*INT (I/16)<8 THEN PRINT
"F";
160 IF I=32*INT (I/32)<16 THEN PRINT
"G";
170 PRINT
180 PAUSE 99
190 GOTO 100
```

This routine uses the IN 65022 instruction to scan the five keys A, S, D, F, G.

QUEST

SIMPLY THE BEST

Momentum is building fast with the **BLACK HOLE** High Score **COMPETITION.** Leading score so far is an amazing 1358 sent in by Ian Garlinge of Littlebourne, Kent.

When we designed the **BLACK HOLE** we decided to provide a real challenge for the player — and we appear to have succeeded since nobody else has managed to pass the 'magic' barrier of 1000. Could YOU be the next?

Our second game, **VIOLENT UNIVERSE,** is now available and will run on any Spectrum. In addition to having the same addictive and challenging quantities as The Black Hole, and another totally original game plan, the **VIOLENT UNIVERSE** offers a complete visual experience with its animated graphics and violent explosive effects.

QUEST — A NEW DIMENSION IN SPECTRUM SOFTWARE — The battle could be yours . . . but it won't be easy!

THE BLACK HOLE and **VIOLENT UNIVERSE** are available from **QUEST, 119 THE PROMENADE, CHELTENHAM, GLOS** at £5.50 each

or from your
local software retailer
For details please ring

0242–583661

FANTASTIC VOYAGE
16K ZX81

A real-time adventure with fast machine-code graphics.

"A very good game indeed"
Personal Computer News
Week ending 22 April

ADVENTURE 200
ZX81 16K/SPECTRUM 16/48K

All machine-code text adventure.

"For ZX81 owners this is a must"
Personal Computer News
Week ending 29 April

All Games £5.95 each or 2 for 9.95

Send SAE for full details

FOILKADE LTD

'SU6' 66 LITTLEDEAN, YATE, BRISTOL BS17 4UQ

If you're a *serious* Sinclair user — why don't you stop playing games?

If you need a new challenge that does'nt involve saving the universe from destruction, beating off green monsters or flying a spaceship — we can bring you down to earth with stimulating, practical projects for the ZX81 and Spectrum in **Sinclair Projects** magazine!

In recent issues we have shown how to use your Sinclair for controlling your central heating . . . improving the graphics . . . build a printer interface . . . and many more ideas that tax your ability and ingenuity.

Sinclair Projects is published every two months as a glossy, instruction-packed magazine that gives you all the encouragement you need to exercise your talent and take a serious look at what your Sinclair can do for you.

Each issue can contain as many as FIVE step-by-step projects — yet it's yours for JUST 95p. So if you want a break from playing games, make sure you order YOUR **Sinclair Projects** from your newsagent today — or fill in the form below and we will send it direct to you, six times per year.

Mail to: ECC Publications Limited: 30-31 Islington Green, London N1 8BJ Yes — I'd like to subscribe to Sinclair Projects (6 issues — price £9.90 including P&P) I enclose a cheque for £ _____
Please charge my credit card: Card name _____ Number _____
Name _____ Address _____
Signature _____ Date _____

NB This offer applies to UK subscribers only. Overseas rates available on request.

The Challenge of the Decade! With NEW Games like CONFLICT and GALAXY CONFLICT

We're adding the latest and best to our catalogue every month from selected sources throughout the UK and North America – so there's a new challenge for you **every time** at prices you won't beat!

Remember – we specialise in programs for your Sinclair – whether you choose games, business, educational or household software. Many of our games cannot be bought by mail order from any other source. And many of our prices are the lowest you'll find **anywhere**. You'll want to make **sure** victory is yours with these new programs where **two can play:**

CONFLICT – Total war for two players, involving both the machinery [armies, missiles, warships] and finance [stock market, oil, piracy] of conflict.

To order quote the following references: – ZX81-16k: C-1; Spectrum-48k: C-2.

GALAXY CONFLICT – Raise the fleet of battle Eoncruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens – to prove yourself a born galactic ruler!

To order quote the following references: ZX81-16k: GC-1; Spectrum-48k; GC-2.

Each comes complete with game board, program, counters, markers, maps [CONFLICT only] plus full instructions and rules of war for the **unbeatable introductory price of £9.95!** [N.B. When ordering be sure to specify the correct order number, dependent upon the type of machine – ZX81 or Spectrum – that you own.]

With our Special deal you can't go wrong:

- ★ FREE offer every time [this time it's a free blank C20 cassette with every two programs ordered]
- ★ A replacement guarantee if you're not entirely satisfied with the quality of your purchase – that's how confident we are!

All you have to do is look at our new HOT selection – then order quickly to benefit from the introductory prices of our new games of skill, intelligence and excitement [fast delivery is another of our specialities – so you could be using these new programs SOON]

GALAXY CONFLICT
(ZX81/Spectrum)
Exciting and Challenging Computer Game For Two Players
se a fleet of battle Eoncruisers, then move from bridge to bridge
taking full control and responsibility in this battle for the heavens.
Born galactic rulers will do well.
CONFLICT
(ZX81/Spectrum)
At last – an Exciting and Challenging Computer Game!

FREE BLANK C20 COMPUTER CASSETTE WITH EVERY TWO CASSETTES YOU ORDER!

Remember there's no limit to the number of free cassettes you receive if your order justifies them — so why not get together with friends or user group members and share the freebies?

GUARANTEE

Order with complete confidence. If you are not entirely satisfied with the quality of your purchase – return it to us within 7 days and we will provide a replacement

GREAT VALUE! TREMENDOUS SELECTION! PLUS A FREE OFFER EVERY TIME!

Fill in the order form right away — we're guaranteeing fast delivery, quality and satisfaction [after all, we want you to come back for more!]

The Software Workshop, Yew Tree, Selborne, Hants GU34 3JP

Challenging Computer Game!
A total war for two players involving both the machinery (armies, warships, piracy) of
Save £2 on normal price!
OFFER CLOSES 31/8/83

Here's a whole NEW selection of the latest games, the best-value software for your ZX-81 or Spectrum.

ZX81 Software

1-01 **Stock Market**
Buy and sell your way to millions! 16K RAM **£3.95**

1-02 **Football League**
First division fun for the soccer enthusiast. 16K RAM **£3.95**

1-03 **Test Match**
Match your wits alongside the superstars. 16K RAM **£3.95**

1-11 **Arcade Action**
Overtaker/Missile Man/Space Fighter/ Pilot/Greedy Gobbler/Extra Terrestrial. 1K **£4.95**

1-12 **Avenger**
Avoid missiles and bombs to become the ruler. 16K RAM **£4.95**

1-13 **Protector**
Defend your own ship from oncoming attackers. 16K RAM **£4.95**

1-21 **Football Manager**
Manage your team through a hectic league season! 16K RAM **£5.95**

Spectrum Software

2-12 **Avenger**
[See 1-12 under ZX81]. 48K RAM **£4.95**

2-13 **Sentinel**
Guard your mother ship against alien attacks. 48K RAM **£4.95**

2-14 **Meteor Storm**
Spectrum version of the ever-popular arcade game. 16K or 48K RAM **£4.95**

2-15 **Star Trek**
Popular space program brought to life by excellent graphics. 48K RAM **£4.95**

2-21 **Frogger**
Manoeuvre the frog across the road avoiding heavy traffic. 48K RAM **£5.95**

2-22 **Crazy Balloons**
Guide the balloons round the maze without bursting. 48K RAM **£5.95**

2-23 **Arcadia**
The expert's version of the popular 'Invaders' game. 16K or 48K RAM **£5.95**

2-24 **Golf**
The finest of golf handicap games. 48K RAM **£5.95**

2-25 **Test Match**
More exciting than the real thing! 48K RAM **£5.95**

2-26 **Derby Day**
This favourite has to be a winner. 48K RAM **£5.95**

2-27 **Rescue**
Rescue the Princess from marauding patrols. 48K RAM **£5.95**

2-28 **The Orb**
Discover the Orb in the depths of the temple but watch the monsters. 48K RAM **£5.95**

2-29 **Jackpot**
The harmless way to take on the one-armed bandit. 48K RAM **£5.95**

2-31 **Football Manager**
See 1-21 under ZX81. 48K RAM **£6.95**

To: The Software Workshop, Yew Tree, Selborne, Hants GU34 3JP

I wish to order the following programs. I understand that:

* I will receive a FREE blank cassette with every 2 programs ordered
* I can return products within seven days if not entirely satisfied and receive a replacement.

Ref No	Qty	Title	Price

Postage, packing and handling: add 45p for the first cassette, and 25p for each additional cassette. Non-UK orders add extra 50%

Total

I enclose a cheque/postal order for _____

Name _____

Address _____

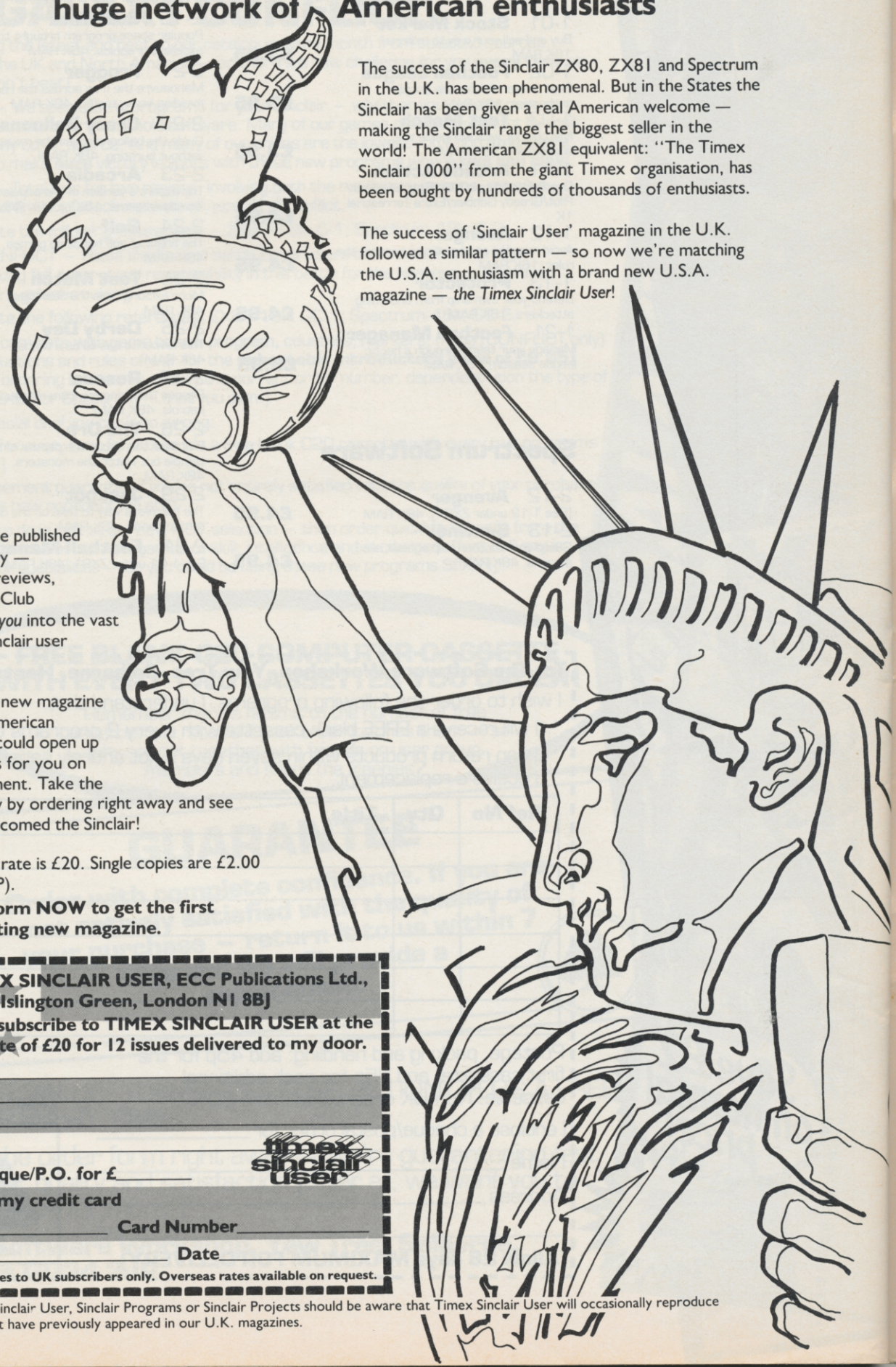
SU7

(Allow 28 days MAXIMUM FOR DELIVERY)

Now you can take a new

AMERICAN look at your Sinclair!

With the new Timex Sinclair User magazine to link YOU into a huge network of American enthusiasts



The success of the Sinclair ZX80, ZX81 and Spectrum in the U.K. has been phenomenal. But in the States the Sinclair has been given a real American welcome — making the Sinclair range the biggest seller in the world! The American ZX81 equivalent: "The Timex Sinclair 1000" from the giant Timex organisation, has been bought by hundreds of thousands of enthusiasts.

The success of 'Sinclair User' magazine in the U.K. followed a similar pattern — so now we're matching the U.S.A. enthusiasm with a brand new U.S.A. magazine — *the Timex Sinclair User*!

The first issue will be published in the U.S.A. in May — packed with news, reviews, programs and User Club information to link *you* into the vast American Timex Sinclair user network.

Remember, this is a new magazine written from the American viewpoint — but it could open up whole new horizons for you on your Sinclair enjoyment. Take the new, American view by ordering right away and see how the U.S.A. welcomed the Sinclair!

Annual subscription rate is £20. Single copies are £2.00 each (including P & P).

Fill in the order form NOW to get the first issues of this exciting new magazine.

Send to: TIMEX SINCLAIR USER, ECC Publications Ltd., 30-31 Islington Green, London N1 8BJ

Yes, I want to subscribe to TIMEX SINCLAIR USER at the special U.K. rate of £20 for 12 issues delivered to my door.

Name _____

Address _____

_____

_____

I enclose a cheque/P.O. for £_____

timex sinclair user

Please charge my credit card

Card Name_____ **Card Number**_____

Signature_____ **Date**_____

N.B. This offer applies to UK subscribers only. Overseas rates available on request.

N.B. Subscribers to Sinclair User, Sinclair Programs or Sinclair Projects should be aware that Timex Sinclair User will occasionally reproduce top articles that have previously appeared in our U.K. magazines.

Checking the best moves in the growing chess market

Quentin Heath emerges from the dungeons to return to the boards

IN THE LAST few months I have been stuck underground in the *Sinclair User* dungeons with a variety of man-eating monsters, so this month I thought I would seek some fresh air and talk about chess.

In later articles I want to say something about the structure of chess programs but for now I will introduce you to what is available for Sinclair machines.

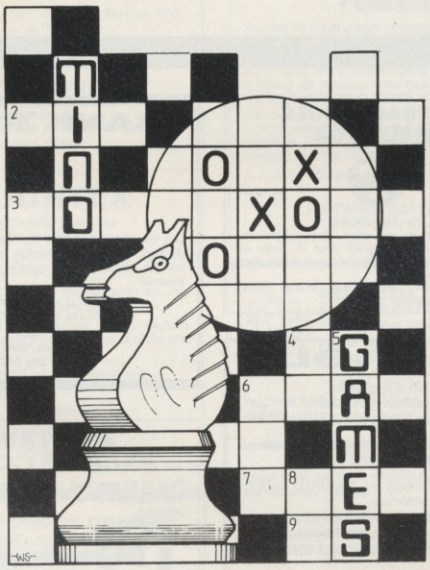
Most of the early ZX-81 games were, more or less, copies of a famous American chess program called **Sargon.** Many manufacturers used the Sargon basic structure and re-wrote the printing routines so that they would be compatible for the ZX-81 screen format.

After a few months of copying, manufacturers began to alter programs to make them play better and run faster. Out of the first batch of games to arrive on the scene, the Artic Computing **ZX-81 Chess** was acclaimed the best by the critics.

The original Artic chess, and its upgraded version, **Chess Two,** have sold well and with good reason. The games include all legal moves, with castling and *en passant,* and can be played at six levels. The easiest level has a response time of about one second and the most difficult, level six, takes several minutes to make a move.

Chess Two plays a good entertaining game for anyone with a slight knowledge of the laws of chess and when I played with it the game did not make an incorrect move, even on the simplest level. It is the game I would recommend for the average player who wants to try to beat a computer at chess. Some people may argue that a computer can play only a mechanical game with no invention or luck but playing a computer will give you some practice if no partner is available.

Artic also produces a technically-excellent game which fits into the 1K ZX-81. It may not play brilliantly but it is fascinating to watch the computer scan the moves available to it graphically on the screen. The computer makes moves very quickly, although it will not allow



the usual *en passant* and castling which are available on the bigger games. The game loads very quickly and at £2.95 it is worth the money.

Artic has upgraded its ZX-81 chess games to the Spectrum. There are at present three versions but only one is for the 16K Spectrum. So far as I know it is the only chess program for the 16K machine. Its playing standard is similar to that of ZX Chess Two.

The most interesting of the chess programs from Artic is **Voice Chess.** It not only plays as well as **Spec Chess,** the other game in the trio, but each move made is announced by a voice which is generated by the Spectrum loudspeaker.

Some people have asked if the amount of memory used to store the voice affects the quality of the game. So far as I can tell, it does not do so noticeably. Most chess programs occupy a great deal less room than 48K and the voice is just filling the space which is not used. My own feeling is that if you want a game with novelty you should buy Voice Chess but if you just want to buy a good game with no frills, 48K Spec Chess and 16K Micro Chess are choices.

Master Chess, from Mikro-Gen, also provides a formidable game. It runs on a 48K Spectrum and has 10 levels of play which are numbered from zero to nine. If you do not know which move to make the computer will suggest one for you. The game also includes an analysis option which can be used to solve chess puzzles.

The Masterchess program is capable of all legal moves, including *en passant* and castling.

To see how the games compete with a real chess machine I played a game between the Quicksilva Chess Player and a Sci-Sys chess computer. The results were interesting. Sci-Sys was slower in making moves than the Quicksilva game on level one but the dedicated chess computer earned checkmate in 67 moves.

What was also interesting was that the Sci-Sys system often anticipated the moves of the Chess Player. That may indicate that most structures are similar.

The final game I want to examine is the best available, in my opinion. **Superchess Two** is from CP Software and is a chess player's dream. The range of options includes 10 levels of play, a recommended move option, self-play, analyse and technical information.

The self-play mode pits the computer against itself so that you can see how it solves game problems. You can also provide it with problems to analyse and solve.

The most advanced level is level 10. At that level the computer can take several hours to make up its mind about a move.

The game also includes an option which I have never seen in other chess programs. The technical information option will tell you how the program is structured and which techniques are used for the computer to find its next feasible move. Explanations of tree searches and data structures is provided to give the player a chance to further the computer's 'mind'.

If you have views on any mind games or if you have hints and tips on adventure games, computer-moderated games, chess, or anything along those lines, you can contact me. I will also try to answer questions which you may have. The address is:

Quentin Heath, Mind Games, c/o Sinclair User, *ECC Publications, 30-31 Islington Green, London N1 8BJ.*

sinclair supermart

1K ZX-81
FREE CATALOGUE

Superb 1K machine code games including MAZE GUZZLER, INVADERS, BREAKOUT etc.

Send S.A.E.

SELEC SOFTWARE

37 COUNCILLOR LANE
CHEADLE, CHESHIRE

PHYSICS
G.C.E. 'O' LEVEL
A.E.B. SYLLABUS 052 1983/4
16/48K SPECTRUM
COMPREHENSIVE EXAMINATION REVISION INCLUDING TUITION
£22
PROGRAMS AND DETAILS FROM:
HOMESTUDY LTD.
TRELEIGH WOODS FARM
REDRUTH CORNWALL

INKOSI

Simulation available for Spectrum 48K. Be an African King! Can you beat the witch doctor? Rule wisely for 10 years or face the wrath of your people! £5.95.

Details of this AND MORE (SAE please) from:

chalksoft Ltd
Dept SU7
Lowmoor Cottage
Tonedale
Wellington
Somerset TA21 0AL

Trade and Export enquiries welcome

FOOTBALL POOLS PREDICTOR

For 16K ZX-81

3+3 methods of prediction. Enter matches, played and draws. Program lists in order of preference. Works on British and Australian results only £4.95.

Matrix Software, 36 Yardley Wood Road, Moseley, Birmingham, B13 9JB.

PAYROLL

For ZX-81 with ZX printer.
12 employees 32K (£17.50).
56 employees 48K (£19.95) incl P&P.

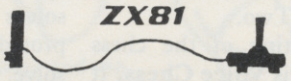
Easy to use. Employee files updated providing printouts of:

- Payslips (Weekly or Monthly) including SSP calculations.
- Tax working sheet details.
- Employers weekly summary of Net pay, NIC, SSP, Tax and Total Gross pay.
- Monthly Tax/NIC payment details.
- Yearly table of returns.

Program includes present rates/bands which can easily be changed. Send cheques/PO's to:

SOFT-TECH
31 Lampits, Herts.

Joystick
SPECTRUM ZX81

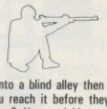


+ fire button
+ controller

ONLY **£20**
inc. VAT & P.P.

A.D. ELECTRONICS
32, HIGH ST.
S. NORWOOD
S.E. 25

'BANK RAID'
(ZX-81 16K)



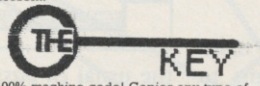
Lure the snipers into a blind alley then make a dash for the bank. Will you reach it before they search you out and gun you down? How quickly can you settle the vendetta?

A game of skill and cunning.
£4.75p cheque/PO to:

J. M. Senior,
8 The Elms, Shaw,
Swindon SN5 9PL.

SPECTRUM BACK-UP COPIER

First of all you had to back-up programs by making tape to tape copies. Now **KEYSOFT** present:



100% machine code! Copies any type of program! Order THE KEY, for any ZX Spectrum, only £5.95.

KEYSOFT, Dept SU2.
6 Bruce Grove, London N17 6RA.

N.B. KEYSOFT advise users not to infringe the Copyright Acts.

DEALER ENQUIRIES WELCOME.

LOCATOR
EDUCATION : ARCADE : MIND GAMES

Get all your **MAJOR TITLES** from **ONE** source. Largest selection available of **EDUCATIONAL** software from **JUNIOR SCHOOL** to **GCE** standard. **SAE** (9×4) for **CATALOGUE.** Some other **'SPECTRUM' TITLES** are:

CHESS	48K-ARTIC	£9.45
CHESS PLAYER	48K-Q-S	£6.95
TIMEGATE	48K-Q-S	£6.95
MINED OUT	48K-Q-S	£4.95
STAR TREK	48K-R+R	£4.95
MICRO CHESS	16K-ARTIC	£6.95
GOBBLEMAN	16K-ARTIC	£4.95
GOLF	16K-R+R	£3.75
SPACE INTRUDER	16K-Q-S	£4.95
METEOR STORM	16K-Q-S	£4.95
TELESOUND 84	COMPUSOUND	£9.95
BEEP BOOST RADIO	COMPUSOUND	£5.95

1 Cassette 35p, p&p: 2 Cassettes p&p **FREE.**
Mail order and local deliveries only.
Locator, 12 Fernhall Drive, Redbridge, Essex, IG4 5BN. Tel: 01-550 5575.

SPECTRUM

Why wait for weeks for your favourite programs? As stockist of most of the best Spectrum Software we offer a fast return of post service and give 12 months guarantee on all tapes supplies. Nearly 150 different programs, all at discount prices. Including those from Silversoft, Quicksilva, Artic, Melbourne House, Imagine etc, plus books, Joysticks and Add-ons. Phone or S.A.E. price list.

Join our Software Club for £3.00 annual membership giving you the following benefits:

10% discount on all orders of software.

Monthly news letter with details of the latest releases.

Special offers each month giving you even more savings.

Ivysoft
91 Cleeve Drive,
Ivy Bridge,
Devon.
Tel: 07554 4088

BORED WITH ARCADE GAMES??
—2 Addictive Simulation Games for the 48K Spectrum—

BREWERY
Bound to appeal to bored arcadists!! You are the owner of a small local Brewery. Your challenge is to effectively market your beer, expand, and become as big as Bass or Courages. But you'll need plenty of skill! The game is Menu Driven, and has many excellent features.

GANGSTERS
A superb game of strategy. You are a small-time gangster: your challenge is to make The Big Time and take control of the City . . . by hook or crook. But you'll have to watch out for the other Gangsters! Packed with super features, the game is both amusing and addictive!.

Each programme costs £5.95, and is available from:

P. BOULTON
Dept SU2, 54 Grange Road, South Harrow, Middlesex, HA2 0LW.

SPECTRUM PROGRAMMERS

Would you like to see your programs **published?**

Original short programs for 16K Spectrum wanted.

Cash paid for de-bugged exciting programs. (Please include print-out if possible).

Contact:

CHP
Dept MS/TH
CASTLE HOUSE PUBLICATIONS
27 London Road
Tunbridge Wells
Kent TN1 1BX.

PROGRAMMES FOR 2–7 YEAR OLDS

Educational games for pre-school and primary children for the Spectrum with full colour animation and sound.

COUNTING: 4 graded programmes. Good as a first introduction to numbers. (16/48K)

ALPHABET: Pictures for each letter, with an option to present lower case letters. (16K or 48K—please specify.)

SHAPE SORTER: 3 programmes to aid shape recognition, observation and size sorting. (16K/48K)

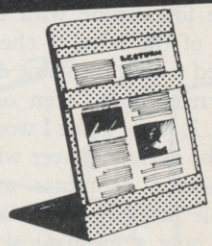
ADD & SUBTRACT: 3 animated programmes from a very simple level. (16K/48K)

All tapes £5.25 each from:

WIDGIT SOFTWARE
48 Durham Road,
London N2 9DT.

Or from W. H. Smith & Son.

PROGRAM HOLDER



- Will hold single A4 sheets just right to copy
- Moveable cursor locates under line being entered
- Leaves hands free
- Prevents sore neck & eye strain
- Increases entry speed & accuracy

ONLY £5.95 (inc vat) + £1 p&p

Send cheque or PO to:

Lectern Products
2 Cypress Walk
Ashton on Mersey
Sale Cheshire

UPGRADE YOUR 16K ZX SPECTRUM TO 48K

SIMPLY FITS INTERNALLY WITH NO SOLDERING ON SERIES 2 MODELS. UNLIKE COMPETITORS, WE USE NO REJECT COMPONENTS AND AN ADAPTOR P.C. BOARD TO ACHIEVE RESULTS. DESIGNED BY EX SINCLAIR ENGINEER. MODEL CP48 £23.95 inc. P&P (EXPORT AND UK). EX STOCK.

32K MEMORY EXTENSION ONLY £23.95

Citadel Products Ltd TEL: 01 951 1848
DEPT SU, 50 HIGH STREET, EDGWARE, MIDDLESEX HA8 7EP

Cassette Compucorder

Compatible with ZX-81, Spectrum and many other Computers.

Features: Tape Counter
MIC, Ear and Rem Sockets
5 pin Din Socket
Batteries/Mains

Money back guaranteed if you are not fully satisfied.

Price £22.95 (including P&P), cheques or postal orders to:

Leyden Enterprises,
41 Broomgrove Gardens,
Edgware, Middlesex.

ZX-81 REPAIR SERVICE

At last no need to wait for weeks, send your faulty ZX-81 for a fast reliable repair.

We will repair any ZX-81 kit or Ready Built Unit.

Please describe the fault briefly and send a cheque/postal order to:

NEXT COMPUTER SYSTEMS
88 Harvest Road
Englefield Green
Surrey TW20 0QR

ONLY £15.95 + p&p £1.75
fully guaranteed.

RAM-SCAN-DESIGN

'ODDS-ON' SPECTRUM 16K/48K

Your own RACE meeting at home with friends. Full scope for straight bets/accumulators. Sound and fully animated horses with form sheets on screen and calculated odds. Quality cassette. Instructions. £4.75 post paid.

Special Double Bill: 'Space Towers' & 'Solo Attack'. Launched randomly, advance through enemy ships and mines using resupply craft, to reach docking gate on home Tower and Aliens attack singly, but rapidly. Your mission? Stop them over-running your base. Full use of Spectrum's Sound and Graphics. £3.95 post paid. (Buy both cassettes save £1.00)

R.S.D., 89 Clifton Road,
Prestwich, Manchester.

HORNBY SOFTWARE

PRO GOLF Spectrum game, 16K and 48K. Realistic game. Highly popular. 9-hole course. Choose your own club, miss the bunkers, water, out of bounds. **£4.95 incl. p&p.**

TROON Spectrum game, 48K only. Highly skillful. 18-hole championship course with graphics. To any handicap. **£6.95 incl. p&p.**

FAMILY GAMES PACK including Sums (maths. aid), Pontoon, Greyhound, Parachutist and Rear Gunner. Spectrum 16K and 48K. **£4.95 incl. p&p.**

Hornby Software
21 Pinfold Hill
Leeds LS15 0PW.

ANVIL COMPUTING

SUPER8 NEW SELF TEACH PROGRAM

For ZX-81 (16K), Spectrum.
TRS80. Video Genie.

★Now you can learn basic fast and efficiently★

★Forget your past programming problems. This program will make it all clear★

★ ★ ★ ★ ★ ★ ★

Cover Arrays, Sorting, Searching, Counting, Decision making tests, Error Trapping, Menu driving etc. You start with short simple programs and build up to full working programs with everything explained in full, precise detail.

★ ★ ★ ★ ★ ★ ★

★This is *NOT* a program you simply copy and run.★
★★ *YOU HAVE GOT TO WORK!!* ★★
But it is written in such a way that you can not get stuck.

★ ★ ★ ★ ★ ★ ★

This program has been fully tested over the past six months by 50 domestic and small business users and we have not received any adverse reports.

★ ★ ★ ★ ★ ★ ★

This program is our own product and is not available from any other source. Full money back guarantee. **£4.75** incl. Postage & Packing (state which computer).

51 Whitcliffe Lane, Ripon, Yorks HG4 2LB.

ZX-81 16K/64K
FAST SAVE/LOAD program

up to 20 times Sinclair speed (4800 BAUD).
Least 10 times Sinclair speed guaranteed. With VERIFY and any part of memory SAVE. Includes tape loading aid. £6.00 incl. VAT & P&P.

Tape loading aid on its own £3.00 incl. VAT & P&P.

Details: 50p refundable against purchase.

MUSAMY SOFTWARE
11 Brettenham Avenue,
Walthamstow,
London E17 5BA.

COUNTEX

Fascinating game for pre/primary school ages

Tests colours, counting, reading, spelling and simple arithmetic.

Familiar shapes in full colour with sound, animation and scoring system.

Graded levels of difficulty with random questions to ensure every game is different and interesting.

£4.95—state 16K or 48K Spectrum.

Cheque/P.O. to:

PB Systems
BEES Centre, Hay Lane,
Braintree, Essex
CM7 6ST

ZX81 SPECTRUM, DRAGON, BBC AND VIC SOFTWARE LENDING LIBRARY

We have for hire from 50p (inc. post) programs for your computer.

£5 life membership (less than the cost of a single game) brings you the SOFTWARE LENDING LIBRARY membership kit, catalogue and news letter.

Send cheque or PO for £5 to:
SOFTWARE LENDING LIBRARY
PO Box 3, Castleford, West Yorks
Starting name, address and computer type.
All tapes used with manufacturers' permission.

3 GAMES FOR SINCLAIR ZX-81 (16K)

(coming soon for the Sinclair ZX Spectrum 48K)

Dungeons of Doom (graphics adventure) £4.00 can you explore the 1,000 locations in this addictive graphics and text adventure game for 1—4 players.

Graf Spee (graphics simulation) £4.00 command the pocket battleship, the admiral Graf Spee. Search the South Atlantic for unarmed allied merchantmen but watch out for British Cruisers. (1 Player)

Baron (complex interactive simulation) £4.00 can you survive as a baron in this 1—4 player interactive game. You need to control your food, population etc. But who do you attack and what for. (sae details)

WOOSOFT
5 Andrews Close, Robertsbridge
Sussex TN32 5PB.

Special Offer: All three programs for £10.

ZX SOFTWARE FOR SPECTRUM 16/48K HOME COMPUTING PACK

★Bank Account Verifier—for checking your balance or statement. Requires ZX printer.
★Tel/Address Book—stores 40/100 records per file on 16/48K. Full user facilities include special search routine.
★Personal Reminder Program—an excellent system for keeping track of birthdays, appointments etc. Shopping List—displays items and prints out your requirements on the ZX printer.

4 Practical Programs, designed for easy use. Complete Pack only £11.95. Any 2 for £6.95 or £3.95 each. Supplied on computer cassette with instructions. Send Cheque/PO (stating machine type) to:

SD MICRO-SYSTEMS
PO Box 24, Hitchin, Herts, SG4 0AE.

The rate for classified advertising in the **Sinclair Supermart** is only £9.00 per single column centimetre.

Is your computer really talking to you like an old friend yet? Now, at last, we have programs that teach your computer to actually speak back to you **intelligently.**

Cassette 1. Speak & Spell you can add speech output to your programs via 'plain English' input STR$ for spectrum 16K + C. Stuart 'Catterbox' — £5.95 for Spectrum 48K £6.95.

Cassette 2. Key sounder for 16K and 48K Spectrum + C. Stuart 'Chatterbox' £6.95. Write, run, load, save basic programs with **Key Sounder** speaking **all** keys pressed (inc. shifts) (ZX-81 sounder in prep.)

Coming soon — foreign languages/English tutors.

Send Remittance to:
S&G (Software)
Whisgills House
Montagu Street,
Newcastleton
Roxburghshire.
Please state Spectrum size.

TUNER

A new musical game concept for **16K/48K ZX Spectrum.** Players tune notes in as few steps as possible. 3 levels of play offer easy and very challenging games. Ideal training for anyone who has difficulty with musical instrument tuning or just good fun for anyone with a musical ear. Attractive use of colour throughout. 1 and 2-player versions on one cassette, with instruction booklet, for just **£5.**

S.A.E. for **ZX-81, Spectrum** software catalogue.

SOFTWARE COTTAGE,
19 Westfield Drive,
Loughborough, Leics. LE11 3QJ.

SPECTRUM 48K
D.I.Y. BOOK-KEEPING

Based on best known book-keeping system for small business: up to 300 invoices per month.

EASY TO USE

Purchase Ledger, Sales Ledger, Sales Journal (£24.95 each), easy-to-use manual.

Spectrum 48K, Printer & 3 tapes (£60)
ALL FOR UNDER £230

Lesson plans and notes available for teachers in F.E. and secondary education.

Further details: **Ramtop Software,** 12 Milnthorpe Road, Burtonwood, Warrington, Cheshire.
For enquiries ring: St Helens (0744) 59883.

SPECTRUM

X-RAY will copy any protected tape onto a blank cassette. Future enhancements will include a microdrive copier and a cassette to microdrive transfer facility.
SYNTHI is a 27 channel sound synthesiser enabling you to put arcade quality effects into your programs. Interrupt driven for speed, excellent quality.
TRACE finds, disassembles and saves blocks of machine code. All Z80 mnemonics handled, offsets etc., calculated.
PEEK reads the very useful information normally hidden in the tape header.
All programs £7.50 each inclusive of post and packing. All supplied with full instructions and **FREE** power supply filter unit.

ZEN SOFTWARE
6, Park Street, Scarborough, North Yorks YO12 4AQ.

MAKING MONEY WRITING ZX-81 PROGRAMS

We could be interested in publishing your ZX-81 programs — big earnings potential. Send SAE for free details to:

NOVUS SOFTWARE
798 Pershore Road, Selly Park,
Birmingham B29 7NG.

SPECTRUM 48K BANK ACCOUNT SYSTEM, full screen entry of cheque and cash card transactions, auto update or standing orders, prints bank statement, cassette, £3.00. K Gouldstone, 45 Burleigh Avenue, Wallington, Surrey.

SPECTRUM SOUND. Obtain high quality sound from your own cassette recorder, with help of this simple cassette. No extras required. Send £2.00 incl P&P to: M. Afzal, Nurses Home, Putney General Hospital, Putney, London SW15.

007 SPY. Lets you stop and copy any cassette. Please state if for ZX-81 or Spectrum. On cassette, £3.00. Bobker (Dept SU), 29 Chadderton Drive, Unsworth, Bury, Lancs.

SPECTRUM, 16K, TAPE 1 — Moon Flight, Lemonade, Dice, Nasties + **2 more; TAPE 2** — Mazeing, Kong, Towers, Snake + **2 more; TAPE 3** — Blackjack, Dragster, 3D Maze, Surround + **2 more;** £3.95 each. Sospan Soft, 1 Warborough Close, Llanelli, Dyfed.

ZX-81 SIDEWAYS COPY copies any height screen sideways onto printer to produce stunning banner effects. Used successfully with "Multigraphics". Send just £1.95 to David King 25 Firtree Way, Hassocks, Sussex.

ZX-81 COPYKAT £1 only. Stops any unstoppable programme for copying uses no memory. Send for short listing, takes one minute to enter, from COPYKAT. 15 Bannister Close, Greenford, Middx UB6 0SW.

PRE-SCHOOL/EARLY SCHOOL CASSETTE suitable school/home. 7 Educational/stimulating programs for children 4—44 yrs! **Written by teachers.** 16K/48K Spectrum. £5 cheque/PO to Essex Software, Dept 1, 16 Huntsmans Drive, Upminster, Essex.

SPECTRUM 16/48K SOFTWARE five exciting games of skill and logic on cassette. Wallball, Batball, Multi-Mastermind (49 versions), Archery, Stockmarket £3.50. D. M. Roberts, 43 Aldwickbury Crescent, Harpenden, Herts.

ZX-81 FIVE BOOKS, 64K RAM, BASICARE BROM, CORE, twelve cassettes all for £100. Telephone: Belfast 776780.

SPECTRUM 48K, superb new **addictive** education program with colour, sound HI-RES screen display. SAE for details or £4.00 for quick delivery contact: John Grain, "Wychwood", School Road, Finstock, Oxford, OX7 3DJ.

TAPE COPIER for the professional—makes multiple copies off all **SPECTRUM** (16K/48K) programs (BASIC/Mcode/Data). Easy to use. MB Guar. £3.95. L. Evans, 16 Stonepit Drive, Cottingham, Market Harborough, Leics.

MINED-OUT. High Score = **5735.** Ian Andrew, 54 London Street, Reading. Telephone: 591678.

GOLDEN OPPORTUNITY. Sinclair Printers only £49.95, ZX81 £45, Sinclair 16K Ram £24.50. Postage & Packing £2.00. Hurry while stocks last. Crossco Supplies (Dept SU), 148 Barrack Road, Christchurch, Dorset BH23 2BD. Tel: (0202) 486207.

BANNED — All arcade-action games from our lists. We specialise in a wide range of adventure and business games from many independent suppliers. Save time, deal with the specialists. Detailed lists supplied. Sagasoft, 148 Barrack Road, Christchurch, Dorset BH23 2BD.

ZX81 WITH 16K RAM PACK. Memotech keyboard with keyboard buffer, tapes incl. 3D Monster Maze, Scramble, etc. and two games program books. Cost £160, accept £100. B&W TV (green screen) £40. Mr W. Hindmarsh, 57 Druridge Drive, Newsham Farm Est, Blyth, Northumberland. Tel: 6035.

SPECTRUM M/C SOFTWARE. Original. 29 lines of 64 characters. For use in your programs, **£3.95.** Missile Attack. Fast arcade game, **£3.65.** Specify 16/48K. Paul Reynolds, Longfield, The Common, Sissinghurst, Kent.

ZX-81 16K GAMES, two education games Anagram and Hangman with excellent graphics plus Fruit Machine incorporating machine code only £4.00. Philip Teakle, 75 Oakhanger Drive, Lawrence Weston, Bristol BS11 0RJ.

SPECTRUM SOFTWARE LIBRARY, many tapes for hire, £1.40 per fortnight, send £5.00 for membership or s.a.e. for details. R. R. Aldridge, 45 Maiden Erlegh Avenue, Bexley, Kent.

ZX-81 16K PLUS printer all as new free printer paper and cassettes worth over £150 real bargain at £100. B. Mujeeb, 14 Garmen Street, Caerau, Maesteg, Mid Glamorgan, CF34 0LN, South Wales.

I.P.A. PRESENTS for the 16K ZX-81, Draw and Dronelander. Create pictures with draw. Commands include store, display, line, **Animation,** CLS. Send £3.00 to I.P.A. PO Box 55, Romford, Essex. (Cheques payable Field).

16K ZX-81 with cassette recorder, ZX-tape controller and input level meter. £60 worth of software (mostly games) including compiler and books. Worth £160 **bargain** at **£100.** Telephone: Farnborough, (0252) 547675.

16K ZX-81 complete, as new, 9 tapes (adventure games) 3 books (machine code) worth over £140, £90 from Tony Dodd, 3 Bath Place, Oxford, OX1 3SU.

16K ZX-81 as new complete with manual leads plus 2 high quality games cassettes and assorted magazines, worth over £90 **bargain** at **£75** ono. Telephone Duntocher 76568.

16K ZX-81 with ZX-printer, original boxes, leads, manuals plus 2 Sinclair cassettes, 8 rolls of paper, Machine Code and Getting Acquainted books **£95** ono. Tel: Potters Bar (0707) 56375 (evenings).

ZX-81 16K machine code games: Asteroids, Invaders, Scramble, Galaxian, Defender — £1.50 each. Puckman, Pheonix, Krazy-Kong, Frogger — £2.50 each. G. L. Stoneman, 1 Tarnside Road, Orrell, Wigan, Lancs, WN5 8RN. (No personal callers).

48K SPECTRUM GAMES

Simply the best Value Software...

VELNOR'S LAIR only £6.50 inc p&p

Can you find and destroy the evil wizard VELNOR and so prevent his reign of terror on Earth?

- ★ You can be a wizard, warrior or priest
- ★ Use spells such as polymorph, teleport, fireball, shield, heal and dispel undead
- ★ Collect treasures and items to help you on your quest
- ★ Encounter vampires, mummies, goblins, orcs, trolls and other creatures too ghastly to speak of
- ★ Score, save facility and full documentation

"Like a good book, you don't want to put it down. . . . If you are a D&D person then this game is a must for your collection."

HOME COMPUTING WEEKLY, 10th May 1983

TWO CLASSIC GAMES ON ONE TAPE FOR ONLY £5.50 inc p&p

MUNCH MAN

- ★ 4 ghosts and power pills
- ★ Real munching action in all 4 directions
- ★ Fruits for extra points
- ★ Increasing difficulty from easy to impossible
- ★ High score
- ★ Superb graphics
- ★ Hold game facility

STAR TREK

- ★ All of the usual features plus:
- ★ Automatic short range scan
- ★ Galaxy chart
- ★ Anti-matter bombs
- ★ Klingon attacks on Starbases
- ★ Graphic Warp
- ★ Excellent use of graphics and sound
- ★ 9 levels of play

neptune games from another world

NEPTUNE COMPUTING (DEPT SU4)
98 Howe Street, Gateshead,
Tyne and Wear, NE8 3PP

Tapes also available from: Last chance Leeds
Dragon Byte Morley
The Computer Shop Newcastle

MAIL ORDER ADVERTISING
British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Sinclair User* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of *Sinclair User* summarizing the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you do write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £4,250 per annum for any one Advertiser so affected and up to £10,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with at the discretion of *Sinclair User*, but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc, received as a result of answering such advertisements). Classified advertisements are excluded.

Reach an estimated readership of over 200,000 users per month for as little as £2.00*.

Or if you are starting your own small business advertise in the supermart for only £10.00.

Yes all you have to do is fill in the coupon below including your name, address and/or telephone number and send to: Supermart, Sinclair User, ECC Publications, 30–31 Islington Green, London N1 8BJ.

Maximum 30 words.

Your advert will appear in the earliest possible edition.

Name .....

Address .....

..... Tel: .....

Have you included the fee of £2.00 or £10.00?

***for second hand sales only**

Conditions
The Advertisement Manager reserves the right to alter, reject or suspend an advertisement without assigning any reason. Advertisements are accepted subject to approval of copy and to the right of the Advertisement Manager to alter, reject or cancel any order without explanation. The Proprietors are not liable for any loss from any cause whatever, nor do they accept liability for printers' errors. The Advertisers shall indemnify the Publishers in respect of any claim, cost and expenses arising out of any libellous or malicious matter or untrue statement in any advertisement published for the advertisers, or any infringement of copyright, patent or design therein. The placing of any order will be deemed to be an acceptance of these conditions.

Advertisement Index

AGF Hardware 20, 21
Abersoft 64
Addictive Games 16
Afdec Electronics Ltd 82
Basicare Microsystems 40, 41
Buffer Micro Shop 84
Bug Byte 36
CCS 15, 65
CP Software 90
Calpac Computer Software 83
Cambridge Computer Store 95
Cambridge Computing 88
Cambridge University Press 74
Campbell Systems 65
Carnell Software 48
Compusound 80
Computer Add-Ons 11
Crystal Computing 93
DJL Software 40
DK 'Tronics 6, 7
Digital Integration 78
Docimodus 48
East London Robotics 8
FB Tronics 26
Felix Software 47
File Sixty 12
Mr A Firminger 65
Foilkade 99
J K Greye Enterprises 32
Hestacrest Ltd 94
Hewson Consultants 79
Hilton Computer Services 74
Interface 77
Island Records 63
Kayde ..... IBC
Kempston ..... IFC, 94
Kemsoft 80
Kernow Software Services 93
Linsac 41
Load Runner 89
MC Lothlorien 88
Martech Games 47
Melbourne House Publishers 30
Memotech 31
Micro Aids 26
Micro Power 15
Micronet 800 76
Microsphere 95
Microtext (U.K.) Ltd 94
Mikro Gen 32
Myrmidon Software 15
National Extension College 64
Neptune Computing 106
Odyssey Computing 78
Orwin Software 87
Oxford Computer Publishing 83
PSS 22
Picturesque 16
Print & Plotter 4
Quest Micro Software 39, 99
Quicksilva ..... OBC
RD Laboratories 74
R & R Software 47
Rose Software 80
Servodata Ltd 84
Richard Shepherd Software 46
Sherston Software 90
Sinclair Research Ltd 42, 43
Softeach 26
Software Library 78
Software Supermarket 25
Software Workshop 100, 101
Spartan Software 83
Spectrum Associates 68-71
Stellar Software 90
Supermart 104, 105
Tasman Software 84
Timedata 16
Transform Ltd 88
University Software 93
Virgin Games 19
Winters Ltd 77
Wye Valley Software 64
Zap UK 34, 35

KAYDE

KEYBOARDS - ZX81 Spectrum.

Features include
ZX81 Repeat key and Spectrum Double shift key.
All keyboards are 'electric typewriter' quality, full size and are fully built and tested. They allow you to use all other add-ons. No extra power is needed. Fully guaranteed.
A fitting service is available for all our keyboards and costs £4.00 including postage and packing. Send for details.

Kayde Standard Keyboard
This is used for both computers, but does not accomodate them inside the casing. Open your computer and plug in the connector. (The ZX81 requires two simple solder connections). The keyboard comes complete with high-impact black plastic case and full fitting instructions. The ZX81 has a repeat key. £30

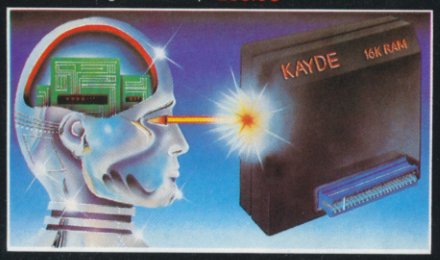
Kayde Super Plug-in Keyboard
This is the ultimate keyboard for your Sinclair computer, you simply plug it into the user port at the back. No disassembling. Complete with full-size space bar and ZX81 repeat key. £49.95

KAYDE DELUXE KEYBOARD
This keyboard is only available for the spectrum. It will allow you to fit your computer inside. It also has a full sized space bar and double shift key. No soldering required. £45.00

NEW! NEW! NEW! NEW! NEW! NEW! NEW!

Kayde ZX81 16K RAM Pack
Low power feature allows you to use all other add-ons including ZX81 printer without wobble overheating or memory loss. You should only have to buy one RAM Pack for your ZX81 so buy the best at the beginning and save yourself unnecessary problems. £19.50

Kayde Spectrum 32K RAM Pack (Issue II)
This brings your Spectrum up to a full 48K. It is easily fitted, and comes as a kit with RAM chips that slot into existing connectors. No soldering necessary. £35.95



RAM Packs
All Kayde RAM Packs use state of the art technology and feature top-quality, low power memories. Housed in high-impact polysterene, they look good and are fully tested and guaranteed.

NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW! NEW!

Kayde Spectrum Light Pen.
This has the ability to create pictures, sketches or graphs on your own television screen or it can be used to 'pick' from the menu saving you time over using BASIC programming statements. No knowledge of machine code programming is necessary. Each Light Pen comes complete with interface circuits mounted on a connector which plugs directly into the user port with no other connections to make and a software program with comprehensive instructions. £19.95

VALUE! VALUE! VALUE! VALUE! VALUE! VA

Kayde 4K Graphics ROM Pack
This comes complete with a pre-programmed 4K Graphics ROM to give you an extra 450 graphics. The board has facilities for either 2K of RAM (for user definable graphics) 4K of RAM or our 4K Tool Kit. The entire board fits neatly inside your computer.
A free fitting service is available on request.

4K Graphics Board	£19.95
4K Tool Kit	£9.95
2K UDG ROM and Character Generator Cassette	£10.95
16K Graphic Software Peckman	£5.95
New! Ladders	£5.95

VALUE! VALUE! VALUE! VALUE! VALUE! VAL

Kayde Spectrum Sound Module
This module fits neatly inside your Spectrum and lets the sound come through the more powerful speaker on your television rather than the Spectrum. No soldering required. £9.95

Kayde BBC/Spectrum Sound Module.
This sound module plugs into the user port at the rear of your computer and requires no soldering. £12.95

Kayde Keys (VIC 20)
This program runs on just 300 bytes and yet gives you the use of function keys and characters on a VIC 20, and there are over 25 commands at your disposal. £6.95

Design/Restore (VIC 20)
A complete system to enable you to create your own characters. Also includes restore program to load characters into your VIC. Three character sets included. £9.95

NEW! NEW! NEW! NEW! NEW! NEW! NEW!

Kayde Software
The Swamp
Available for VIC 20,(16K) Dragon 32, New Brain, Oric 48 and 48k Spectrum

Death stalks the Swamp at every turn. Nowhere is safe and you're on your own. You survive on your wits alone with nobody to help you. Be thankful it's only the latest game from Kayde You'll gasp with relief when you come to the end of the struggle against some of the most dangerous monsters ever programmed. You can be sorcerer, wise man, mercenary, knight or a druid. But you've got to be good. No silly problems to hinder your progress. It's just you against the swamp. £9.95

SOFTWARE WRITERS WANTED
If you want the best deal for your original programs then send a copy to us for review. We offer highest royalties, security and marketing. Don't forget to include a description of the program and for what machine it is intended.

Mail Order Lists
For full mail order lists write to the address below.

ALL ITEMS AVAILABLE AT GREENS STORES DEPT IN DEBENHAMS
24 HOUR TELEPHONE SERVICE:
Tel: (0493) 55253/57867
Dealers Welcome

Mail Order + Showroom
Kayde Electronic Systems Ltd., The Conge
Great Yarmouth Norfolk NR30 1PJ
Tel:(0493) 55253/57867 Telex: 975525 KAYDE G.

New London Showroom
Kayde Home Computers Ltd 1 Station Approach
New Eltham London SE9 Tel: 01-859 7505

ALL MAIL ORDERS
TO: KAYDE ELECTRONIC SYSTEMS LTD, DEPT. SU 7 THE CONGE, GREAT YARMOUTH, NORFOLK NR30 1PJ

PLEASE PRINT AND STATE TYPE OF COMPUTER

Qty.	Item	Item Price £	Total £

Please allow £2.00 P&P for all Hardware 50p for all software.

DON'T FORGET YOU CAN ALWAYS ORDER ON THE TELEPHONE WITH YOUR CREDIT CARD. DEALERS WELCOME.

*I enclose a cheque/postal order payable to ***KAYDE Electronic Systems Ltd,*** for £.....

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable.

Signature _____

Name: Mr/Mrs/Miss

Address

SPECTRUM & ZX81 GAMES FROM QUICKSILVA

A WHOLE GALAXY OF ACTION AT YOUR FINGERTIPS

NEW RELEASES FOR THE ZX81 & SPECTRUM

SPECTRUM SOFTWARE

TIME-GATE
4D Space/time adventure in fast moving graphics. 48K.
Author: **John Hollis**

THE CHESS PLAYER
With Speech and personality. 48K.
Author: **Martin Wren-Hilton**

METEOR STORM
With speech and Hi Res Graphics. 16K or 48K.
Author: **John Hollis**

SPACE INTRUDERS
With mutants and Hi Res Graphics. 16K or 48K.
Author: **John Hollis**

EASYSPEAK
Add speech or music to your programs. 48K.
Author: **John Hollis**

MINED-OUT
With 9 levels of minefield. 48K.
Author: **Ian Andrew**

SOFTWARE FOR THE ZX81 WITH 16K RAM

QS ASTEROIDS
"...very good..."
"...addictive game!" (C. & V.G.).
Author: **John Hollis**

QS DEFENDA
"...better than any other arcade game I've seen." (Sync.).
Author: **Nick Lambert**

QS SCRAMBLE
"...amazing, fantastic!" (PC.W.).
Author: **Dave Edwards**

QS INVADERS
"...just like the real thing!" (C. & V.G.).
Author: **Dave Edwards**

MUNCHEES
Features 1 to 4 Ghosts, 3 Munchees, Power pills
Author: **A. Laird**

GALAXIANS & GLOOPS
Features two types of swooping Galaxian.
Author: **T. Beckwith**

CROAKA-CRAWLA
With Frogs, Lorries, Logs, Crocodiles, Turtles, Flies.
Author: **John Field**

SPECTRUM FRENZY
Arcade action
Features: Full colour hi-res graphics, sound, high score table, hold feature, 5 levels of robots, Evil Orville the minelayer, exploding pods, progressive difficulty, attract mode.
Author: **David Shea**

ASTRO BLASTER
Arcade action
Features: Full attract mode, 5 attack waves, 15 levels of difficulty, rapid fire, meteor storms, changing aliens, plasma bolts, killer bombs, full colour hi-res graphics, full sound.
Author: **John Edwards**
16K or 48K Spectrum

EDDIE A WORD PROCESSOR
Features:
Menu driven prompts given at all times.
Drastic commands — e.g. Clear Text — are automatically questioned.
Load/save commands... all text justified, on screen as well as printer.
Author: **P. Baker**
48K Spectrum

PIXEL GAMES FOR THE ZX81 WITH 16K RAM

TRADER
A trilogy of 16K programs that combine to give an epic 48K graphic adventure. As a galactic trader, you deal with some very bizarre customers indeed.

STOP PRESS
Trader now available for the Spectrum £9.95

SUBSPACE STRIKER/ZOR
With your deadly antimat torpedoes, you unleash havoc in the Federation's Spacelanes.

STARQUEST/ ENCOUNTER
With the help of your onboard computer you seek a habitable planet amidst the perils of deep space.

ZX81 GAMES

OCEAN TRADER
An adventure set in the 19th Century.
You own and captain a vessel, sail between 5 ports and deal in coal and whisky; with storms, pirates, sea mist and vessels adrift.
Author: **A. Morgan**
ZX81 with 16K RAM

COSMIC GUERILLA
Arcade action
Fast m/c action, will drive QS sound and character boards, responsive controls, high score tables.
Author: **C. K. Tame**
ZX81 with 16K RAM

3D BLACK STAR
Arcade action
Features: Fast 3D graphics, fast scoring, four types of target. Eight instrument displays, warp drive, resurging aliens, time limit, 17 levels of progressive difficulty, high score table.
Author: **M. Sudworth**
ZX81 with 16K RAM

DAMPER & GLOOPER
Arcade action
Features: Fast action, 5 dampers increase to 6 on later phases, 3 lives plus bonus lives, ever increasing speed, high score, stall frame features, spiral clear at end of games, bonus phase worth 5000 pts., high score save and display.
Author: **P. Crane**
ZX81 with 16K RAM

PIONEER TRAIL
A western adventure
Features: 20 levels of play. "Mind Game" plus shooting rifle speed uses all keys and is measured against the players personal average response. This game is based on historical data.
Author: **Marion Stubbs.**
ZX81 with 16K RAM

Quicksilva Limited,
Palmerston Park House,
13, Palmerston Road,
Southampton. SO1 1LL.
Telephone: (0703) 20169

SPECTRUM ARCADE ACTION FROM QUICKSILVA
QS DEFENDA ZX-81 GAMES FROM QUICKSILVA
QS ASTEROIDS ZX-81 GAMES FROM QUICKSILVA
CROAKA-CRAWLA ZX-81 GAMES FROM QUICKSILVA
GALAXIANS & GLOOPS ZX-81 GAMES FROM QUICKSILVA
MINED-OUT SPECTRUM GAMES FROM QUICKSILVA
THE CHESS PLAYER SPECTRUM GAMES FROM QUICKSILVA
FOR THE ZX-81 WITH 16K RAM
RUNS IN 48K IN THE SINCLAIR SPECTRUM

SPECTRUM GAMES	
Time Gate	£6.95 ☐
Frenzy	£4.95 ☐
Mined-Out	£4.95 ☐
Easyspeak	£4.95 ☐
Astro Blaster	£4.95 ☐
Meteor Storm	£6.95 ☐
The Chess Player	£4.95 ☐
Space intruders	£5.95 ☐
Eddie A Word Processor	£9.95 ☐
Trader	

PIXEL GAMES FOR ZX81	
Trader	£9.95 ☐
Subspace Striker & Zor	£3.95 ☐
Starquest & Encounter	£3.95 ☐

ZX81 GAMES	
QS Asteroids	£3.95 ☐
QS Defenda	£3.95 ☐
QS Scramble	£3.95 ☐
QS Invaders	£3.95 ☐
Croaka-Crawla	£3.95 ☐
Galaxians & Gloops	£4.95 ☐
Munchees	£3.95 ☐

Black Star	£4.95 ☐
Cosmic Guerilla	£3.95 ☐
Damper & Glooper	£4.95 ☐
Ocean Trader	£3.95 ☐
Pioneer Trail	£3.95 ☐

Total cheque/PO. enclosed .....
Cheque payable to Quicksilva

Name _____

Address _____

Please send me the games as ticked. Supplied on Cassette

Send order to:
Quicksilva Limited, Palmerston Park House, 13, Palmerston Road, Southampton.

WARNING: These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale. Copies of which are available on request.